VG

ORIGINAL

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF TEXAS
DALLAS DIVISION

RESEARCH IN MOTION LIMITED and RESEARCH IN MOTION CORPORATION,	§	
Plaintiffs,	§	Civil Action No.
v.	§	3-08CV0903-G
IPCOM GMBH & CO., KG,	§	Jury Trial Demanded
Defendants.	§	

22249

Complaint for Declaratory Judgment of Patent Non-Infringement and Invalidity

Plaintiffs Research In Motion Limited ("RIM Ltd.") and Research In Motion Corporation ("RIM Corp."), (collectively, "RIM"), for their Complaint against Defendant IPCom GmbH & Co., KG ("IPCom"), hereby demand a jury trial and allege as follows:

NATURE OF THE ACTION

1. This is an action arising under the patent laws of the United States, 35 U.S.C. § 1, *et seq.*, and under the Declaratory Judgment Act, 28 U.S.C. § 2201, *et seq.*, for a declaratory judgment that RIM does not infringe IPCom's patents and that IPCom's patents are invalid.

PARTIES

2. Plaintiff RIM Ltd. is a corporation organized and existing under the laws of the province of Ontario, Canada, having its principal place of business at 295 Phillip Street, Waterloo, Ontario, Canada N2L 3W8.

3. Plaintiff RIM Corp. is a corporation organized under the laws of the state of Delaware, having a principal place of business at 122 West John Carpenter Parkway, Suite 430, Irving, Texas 75039. RIM Corp. is the U.S. distributor of RIM Ltd. products and services.

4. Upon information and belief, Defendant IPCom is a corporation organized and existing under the laws of Germany, having its principal place of business in Pullach, Germany.

JURISDICTION AND VENUE

5. This Court has jurisdiction over the subject matter of this action under 28 U.S.C. §§ 1331, 1338(a) and 2201 because this action seeks a declaratory judgment regarding rights arising under the patent laws of the United States.

6. This Court has personal jurisdiction over IPCom because IPCom has established minimum contacts with the forum and the exercise of jurisdiction over IPCom would not offend traditional notions of fair play and substantial justice.

7. Venue is proper in this District under 28 U.S.C. §§ 1391(d) because IPCom is an alien that may be sued in any district.

FACTUAL BACKGROUND FOR DECLARATORY JUDGMENT COUNTS

8. Upon information and belief, IPCom is the assignee of United States Patent No. 5,390,216 entitled "Synchronization Method for a Mobile Radiotelephone" (the "'216 patent"), attached hereto as Exhibit A.

9. A valid and justiciable controversy regarding the '216 patent has arisen between RIM and IPCom that is properly presented for judicial relief under the Declaratory Judgment Act, 28 U.S.C. §§ 2201 and 2202.

10. RIM has not infringed and is not infringing any valid and enforceable claim of the '216 patent. In addition, the claims of the '216 patent are invalid.

11. IPCom is the assignee of record of United States Patent No. 6,535,750 B1 entitled "Radio Apparatus, Especially a Mobile Telephone" (the "'750 patent"), attached hereto as Exhibit B.

12. A valid and justiciable controversy regarding the '750 patent has arisen between RIM and IPCom that is properly presented for judicial relief under the Declaratory Judgment Act, 28 U.S.C. §§ 2201 and 2202.

13. RIM has not infringed and is not infringing any valid and enforceable claim of the '750 patent.

14. IPCom is the assignee of record of United States Patent No. 6,987,980 B1 entitled "Transmission Frame and Radio Unit for Transmitting Short Messages with Different Data Format" (the "'980 patent"), attached hereto as Exhibit C.

15. A valid and justiciable controversy regarding the '980 patent has arisen between RIM and IPCom that is properly presented for judicial relief under the Declaratory Judgment Act, 28 U.S.C. §§ 2201 and 2202.

16. RIM has not infringed and is not infringing any valid and enforceable claim of the '980 patent. In addition, the claims of the '980 patent are invalid.

COUNT I

(Request for Declaratory Judgment of Non-Infringement and Patent Invalidity of U.S. Patent No. 5,390,216)

17. RIM realleges and incorporates herein by reference the allegations contained in Paragraphs 1 through 16.

18. RIM has not infringed, contributed to the infringement of, or induced infringement of any valid and enforceable claim of the '216 patent, either literally or under the doctrine of equivalents.

19. Based on statements made by the applicant during prosecution of the '216 patent, IPCom is estopped from asserting that RIM infringes the '216 patent.

20. The '216 patent is invalid for failing to satisfy one or more of the conditions of patentability under 35 U.S.C. §§ 101, 102, 103, and/or 112.

COUNT II

(Request for Declaratory Judgment of Non-Infringement of U.S. Patent No. 6,535,750)

21. RIM realleges and incorporates herein by reference the allegations contained in Paragraphs 1 through 20.

22. RIM has not infringed, contributed to the infringement of, or induced infringement of any valid and enforceable claim of the '750 patent, either literally or under the doctrine of equivalents.

23. Based on statements made by the applicant during prosecution of the '750 patent, IPCom is estopped from asserting that RIM infringes the '750 patent.

COUNT III

(Request for Declaratory Judgment of Non-Infringement and Patent Invalidity of U.S. Patent No. 6,987,980)

24. RIM realleges and incorporates herein by reference the allegations contained in Paragraphs 1 through 23.

25. RIM has not infringed, contributed to the infringement of, or induced infringement of any valid and enforceable claim of the '980 patent, either literally or under the doctrine of equivalents.

26. Based on statements made by the applicant during prosecution of the '980 patent, IPCom is estopped from asserting that RIM infringes the '980 patent.

27. The '980 patent is invalid for failing to satisfy one or more of the conditions of patentability under 35 U.S.C. §§ 101, 102, 103, and/or 112.

JURY DEMAND

28. Under Rule 38(b) of the Federal Rules of Civil Procedure, RIM respectfully requests a jury trial on all issues and claims.

PRAYER FOR RELIEF

WHEREFORE, RIM prays for judgment against IPCom, and that the Court award the following relief:

A. Declare that RIM has not infringed, has not contributed to infringement of, and has not induced infringement of any claims of the '216 patent, either literally or under the doctrine of equivalents;

B. Declare that the claims of the '216 patent are invalid;

C. Enter an order preliminarily and permanently enjoining IPCom, its officers, directors, servants, managers, employees, agents, successors and assignees, and all persons in active concert or participation with any of them, from directly or indirectly charging RIM with infringement of any claim of the '216 patent;

D. Declare that RIM has not infringed, has not contributed to infringement of, and has not induced infringement of any claims of the '750 patent, either literally or under the doctrine of equivalents;

E. Enter an order preliminarily and permanently enjoining IPCom, its officers, directors, servants, managers, employees, agents, successors and assignees, and all persons in active concert or participation with any of them, from directly or indirectly charging RIM with infringement of any claim of the '750 patent;

F. Declare that RIM has not infringed, has not contributed to infringement of, and has not induced infringement of any claims of the '980 patent, either literally or under the doctrine of equivalents;

G. Declare that the claims of the '980 patent are invalid;

H. Enter an order preliminarily and permanently enjoining IPCom, its officers, directors, servants, managers, employees, agents, successors and assignees, and all persons in active concert or participation with any of them, from directly or indirectly charging RIM with infringement of any claim of the '980 patent;

I. Declare this case exceptional under 35 U.S.C. § 285 and award RIM its reasonable attorneys' fees, expenses and costs incurred in this action; and

J. Award RIM such other and further relief as this Court deems just and proper.

Dated: May 28, 2008

Respectfully submitted,

George W. Bramblett, Jr.
Texas State Bar No. 02867000
Phillip B. Philbin
Texas State Bar No. 15909020
John R. Emerson
Texas State Bar No. 24002053
HAYNES AND BOONE, L.L.P.
901 Main Street, Suite 3100
Dallas, Texas 75202-3789
Tel: 214-651-5000
Fax: 214-651-5940

ATTORNEYS FOR RESEARCH IN MOTION LIMITED AND RESEARCH IN MOTION CORPORATION

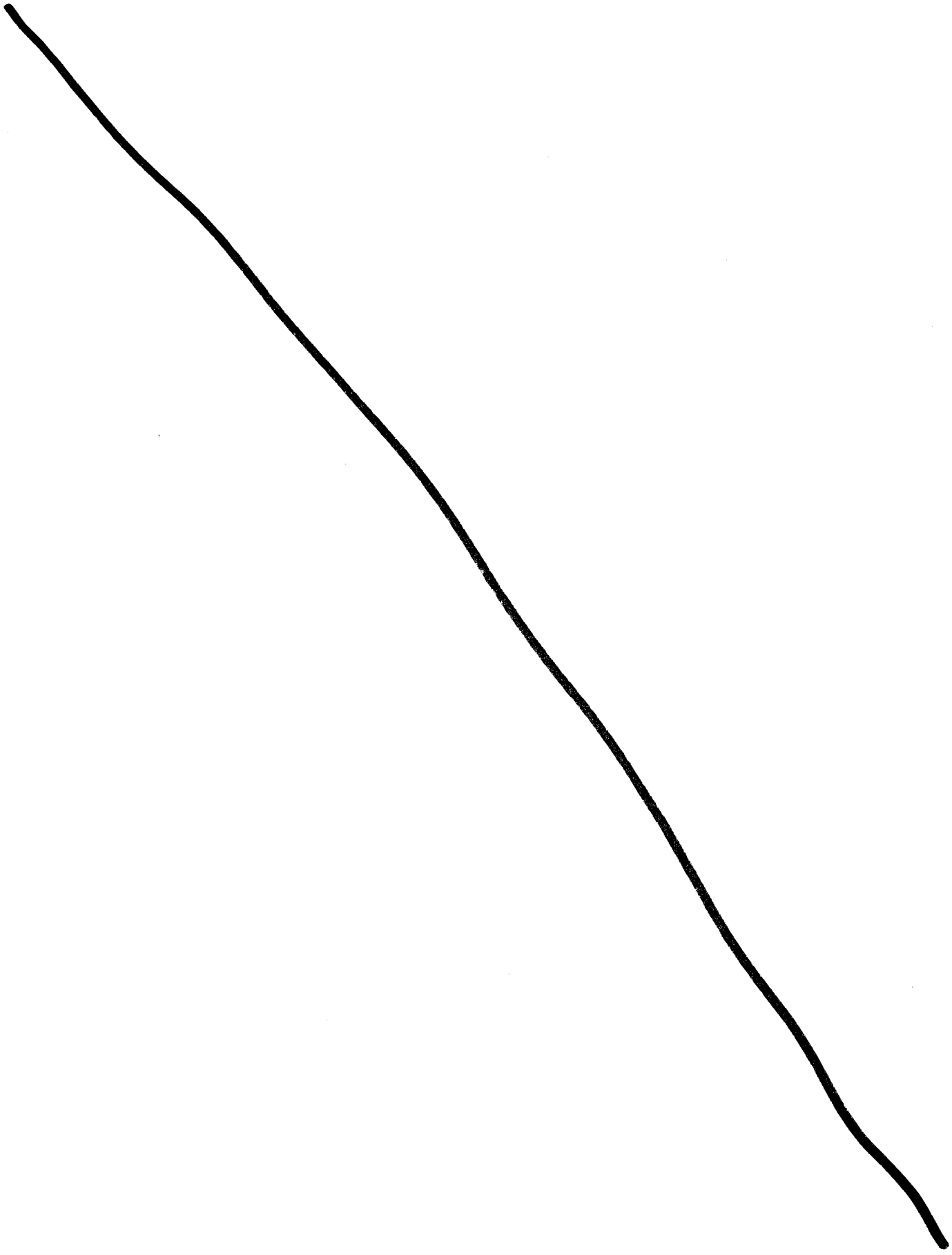

EXHIBIT "A"

US005390216A

United States Patent [19]

Bilitza et al.

[11] Patent Number: 5,390,216

[45] Date of Patent: Feb. 14, 1995

[54] **SYNCHRONIZATION METHOD FOR A MOBILE RADIOTELEPHONE**

[75] Inventors: **Herbert Bilitza; Biegfried Gartner; Hermann Neuner**, all of Berlin, Germany

[73] Assignee: **Robert Bosch GmbH**, Stuttgart, Germany

[21] Appl. No.: **48,804**

[22] Filed: **Apr. 16, 1993**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 984,276, Dec. 1, 1992, abandoned, which is a continuation-in-part of Ser. No. 967,663, Oct. 28, 1992, abandoned.

[30] **Foreign Application Priority Data**

Nov. 2, 1991 [DE] Germany 4136147

[51] **Int. Cl.**[6] **H04L 7/00**

[52] **U.S. Cl.** **375/106**; 375/111; 375/116; 370/105.1

[58] **Field of Search** 375/106, 111, 114, 116, 375/118; 370/95.3, 100.1, 105.1, 106, 105.3; 379/58, 59

[56] **References Cited**

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3739481C2 6/1989 Germany .

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GSM Recommendation 05.04, Modulation, Jan. 1990, 3 pages, Version 3.1.1, ETSI/GSM.

Recommendation GSM 05.10, Radio Sub-System Synchronization, Version 3.4.0, Released by ETSI/PT 12; Release date: Mar. 1990, pp. 1-6.

Primary Examiner—Stephen Chin
Assistant Examiner—Don Vo
Attorney, Agent, or Firm—Frishauf, Holtz, Goodman & Woodward

[57] **ABSTRACT**

The high requirements of digital mobile radiotelephone communication under the GSM Standard with respect to synchronization of a mobile radiotelephone to a fixed radiotelephone station is performed by frequently (four times per so-called baseband frequency cycle) sampling contemporary in-phase and quadrature phase components of received GMSK digital signals and utilization of time slots respectively containing a frequency correction burst, a normal burst and an extended synchronization burst, respectively for initial synchronization, normal maintenance of synchronization during communication and a background procedure during normal operation. The decoding of the GMSK signal provides one-bit of information from each pair of in-phase and quadrature components sampled. The sampling of in-phase and quadrature components greatly simplifies the synchronizing procedure. Initial synchronization includes coarse frequency synchronization, coarse frame synchronization, fine frequency synchronization and fine frame synchronization. Normal maintenance of synchronization consists fine frame synchronization with fine frequency synchronization and a data signal preliminary processing. Extended synchronization consists of coarse frame synchronization and a fine frame synchronization with fine frequency synchronization.

13 Claims, 5 Drawing Sheets

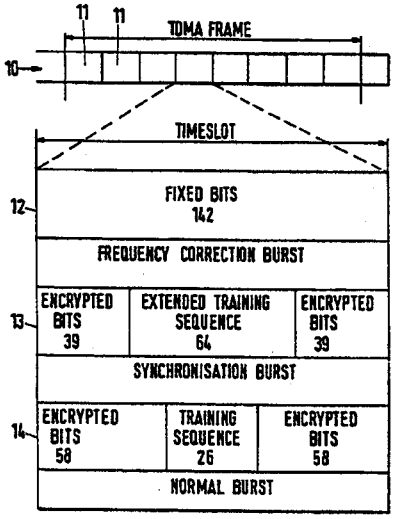
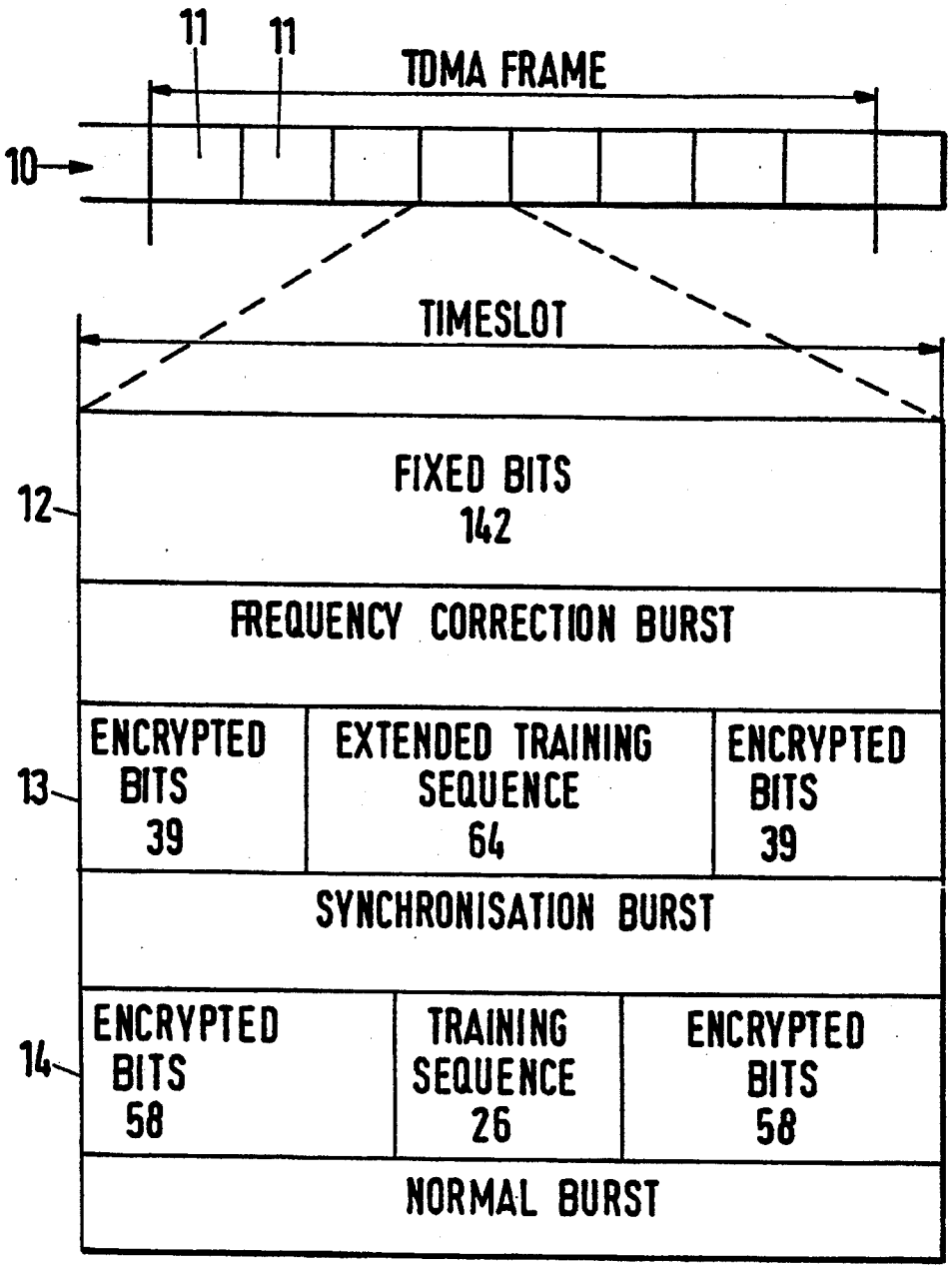


Fig.1


11
11
TDMA FRAME
10
TIMESLOT
12
FIXED BITS
142
FREQUENCY CORRECTION BURST
13
ENCRYPTED BITS 39
EXTENDED TRAINING SEQUENCE 64
ENCRYPTED BITS 39
SYNCHRONISATION BURST
14
ENCRYPTED BITS 58
TRAINING SEQUENCE 26
ENCRYPTED BITS 58
NORMAL BURST

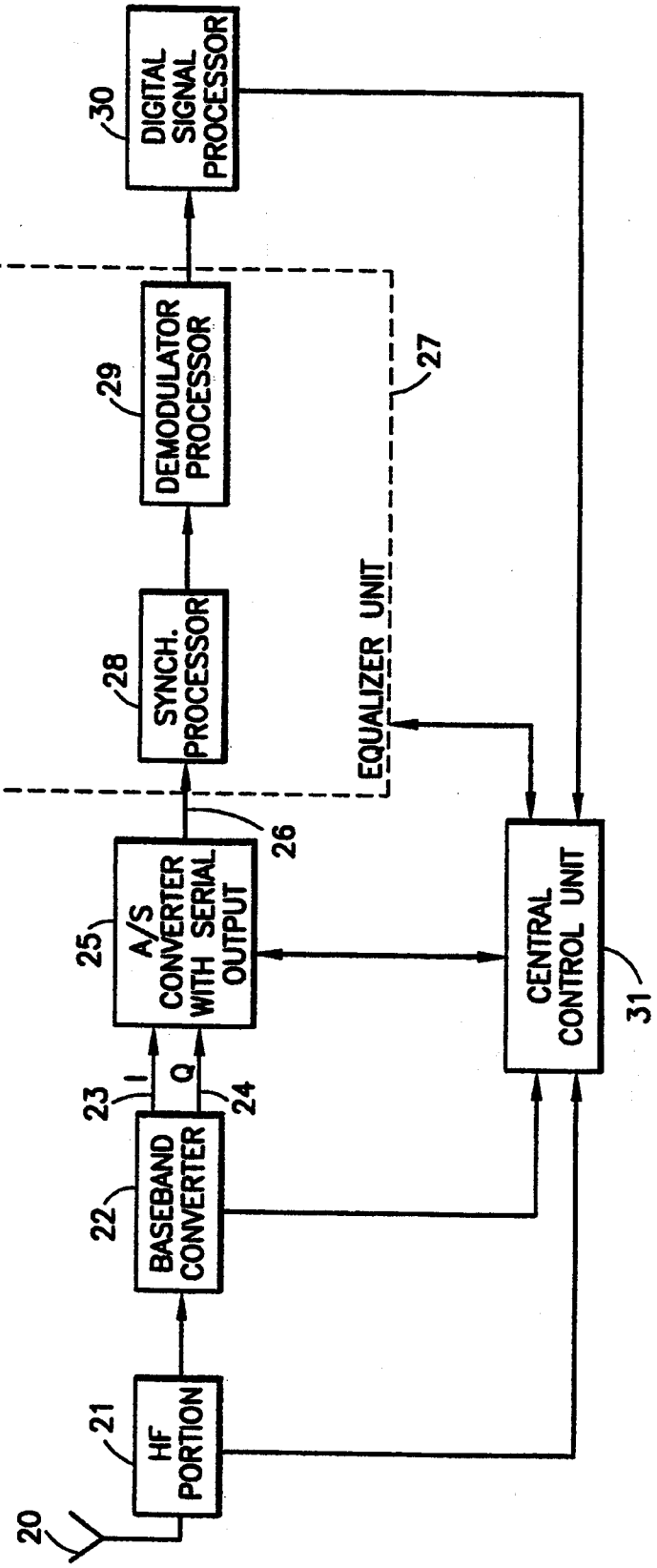

DIGITAL SIGNAL PROCESSOR
30
DEMODULATOR PROCESSOR
29
SYNCH. PROCESSOR
28
EQUALIZER UNIT
27
26
A/S CONVERTER WITH SERIAL OUTPUT
25
CENTRAL CONTROL UNIT
31
I
Q
23
24
BASEBAND CONVERTER
22
HF PORTION
21
20

FIG. 2

Fig.3

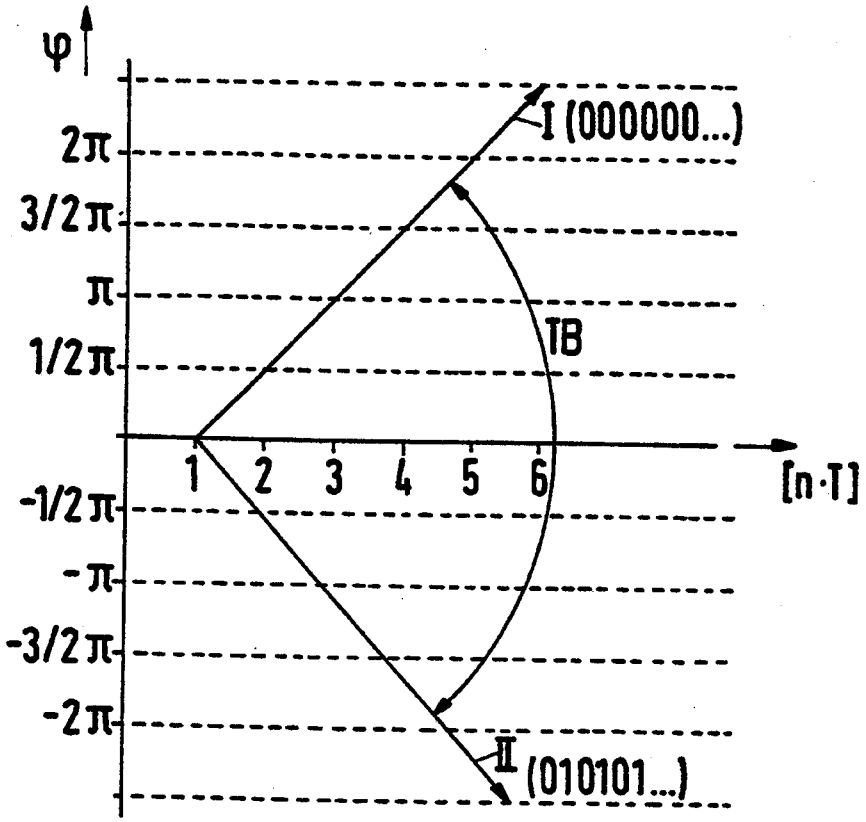
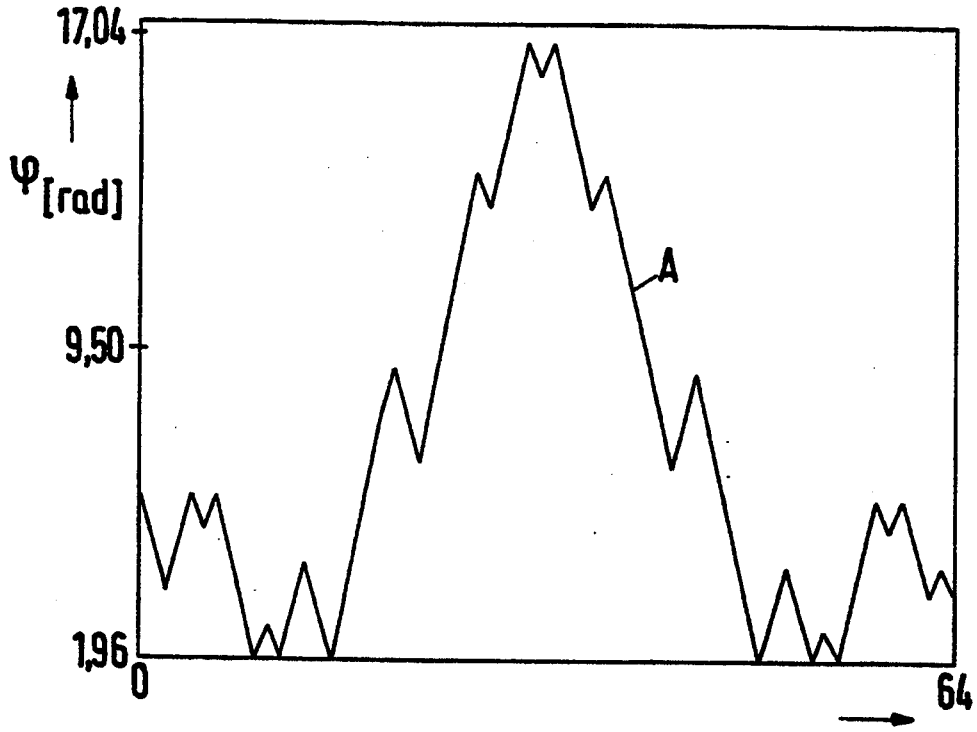


Fig.4A



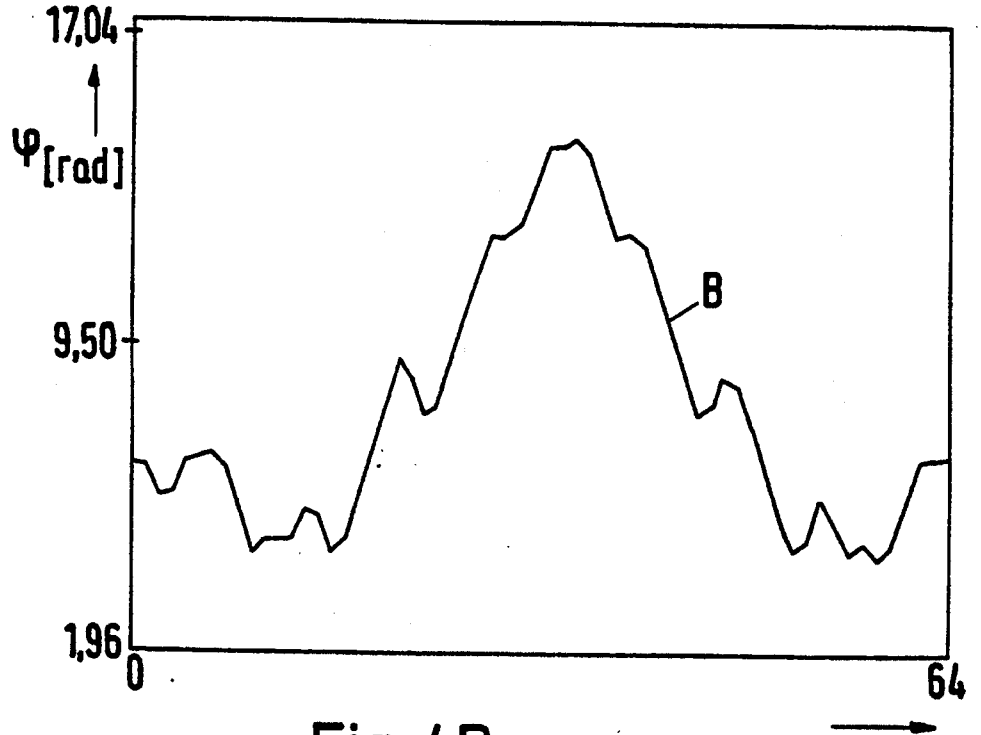
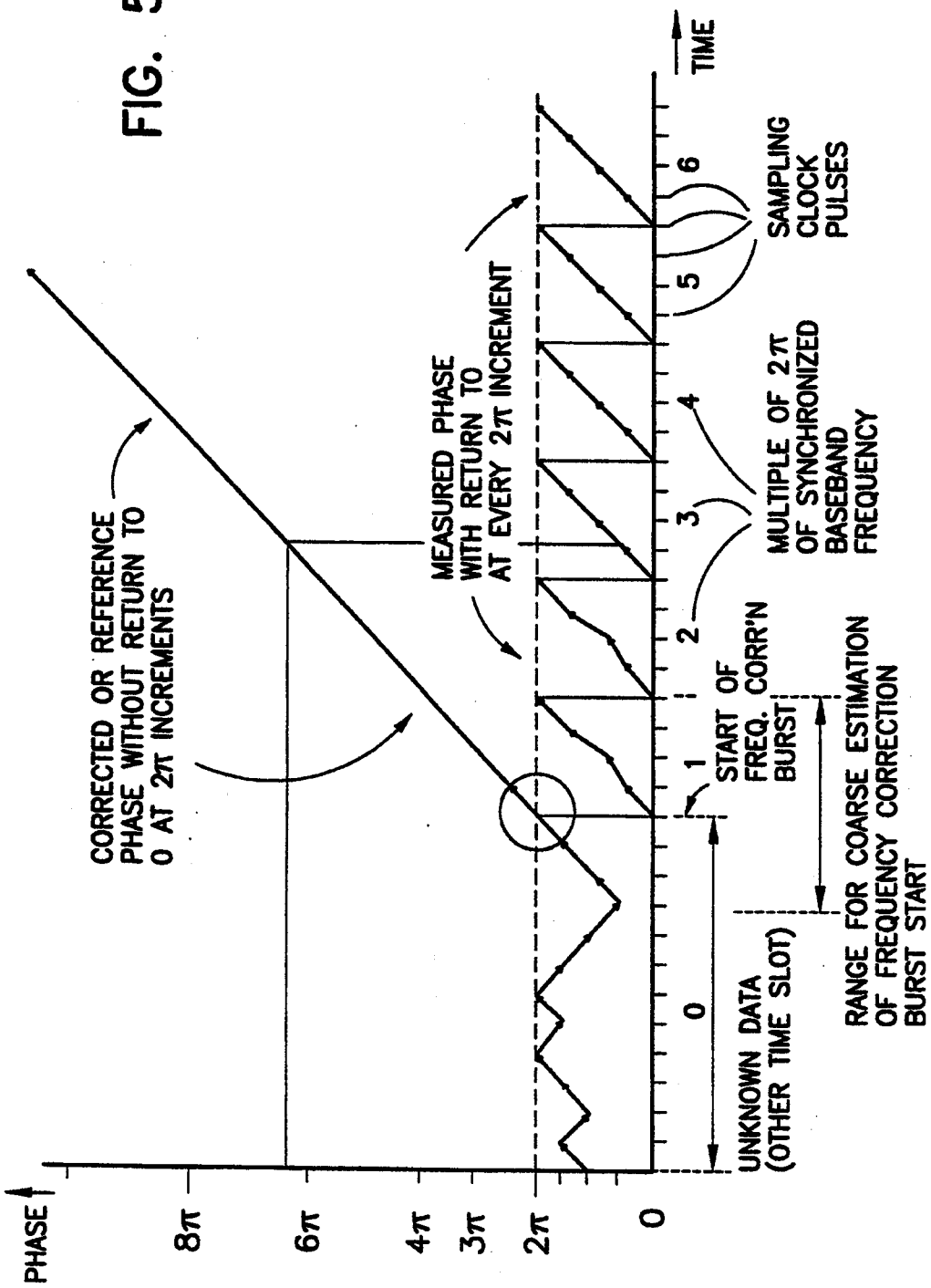


Fig. 4B

FIG. 5


PHASE
8π
6π
4π
3π
2π
0
TIME
0
1
2
3
4
5
6
CORRECTED OR REFERENCE PHASE WITHOUT RETURN TO 0 AT 2π INCREMENTS
MEASURED PHASE WITH RETURN TO AT EVERY 2π INCREMENT
SAMPLING CLOCK PULSES
MULTIPLE OF 2π OF SYNCHRONIZED BASEBAND FREQUENCY
START OF FREQ. CORR'N BURST
UNKNOWN DATA (OTHER TIME SLOT)
RANGE FOR COARSE ESTIMATION OF FREQUENCY CORRECTION BURST START

SYNCHRONIZATION METHOD FOR A MOBILE RADIOTELEPHONE

This application is a continuation in part of application Ser. No. 07/984,276, filed Dec. 1, 1992, now abandoned which was a continuation in part of application Ser. No. 07/967,663 filed Oct. 28, 1992, now abandoned.

This invention is in the field of synchronization methods for mobile radiotelephones in a cellular, digital mobile radiotelephone system comprising a plurality of fixed stations and a plurality of mobile radiotelephones, for example operating according to what is known as the GSM Recommendation.

A known digital mobile telephone system according to the GSM Recommendation requires a relatively great complication and expense for the synchronization of a mobile radiotelephone which is necessary to fulfill the strict requirements pertaining to the transmission of digital information.

BACKGROUND AND PRIOR ART

The digital mobile telephone system which forms the basis for the so-called D-Network used in Germany is generically designated by the acronym GSM, which comes from the French phrase for mobile special group (GROUPE SPECIALE MOBILE). In this system the radio transmission is purely digital, hence the name D-Network. It is a cellular network in the sense that there are many fixed stations with which a mobile station can communicate sequentially as it moves from the cell of one station to the cell of the next.

The receiving frequency region reserved for the D-Network stretches from 935 to 960 MHz and is subdivided into 124 receiving channels each having a 200 kHz bandwidth. Each such frequency band is organized to provide eight participant channels in a time multiplex raster in which the individual time slots are similarly organized frame by frame.

As described in GSM 05.02, released January 1990, there are traffic channels (TCH's) and control channels. The former were sub-divided into encoded speech traffic channels and data traffic channels.

The control channels include frequency correction channels for frequency correction of a mobile station, synchronization channels for a frame synchronization of the mobile station and identification of a base transceiver station and broadcast control channels for general information from a base station. The latter may be organized as common control channels with certain blocks in each common control channel reserved for access grant messages.

A particular set of radio frequency channels is allocated to a particular cell, such a set being defined as the cell allocation (CA). One radio frequency channel of the cell allocation is used to carry synchronization information, known as the BCCH carrier, and serves as the broadcast control channel. A subset of the cell allocation allocated to a particular mobile station is designated as the mobile allocation (MA). A radio frequency channel is partitioned into time slots, so that transmission takes place in time division multiple access (TDMA) frames. There are eight time slots to a TDMA frame, which has a duration of a little less than 5 ms. At a base station the start of a TDMA frame on the uplink is delayed by the fixed period of three time slots from the start of the TDMA frame on the down link, while at a mobile station this delay will be variable to allow adjustment for a signal propagation delay. This adjustment is referred to as adaptive frame alignment.

With the above general information, a known synchronization system incorporated in GSM recommendation 05.10 can now be described.

A base station sends signals on a broadcast control channel to enable a mobile station to synchronize itself to the base station and if necessary correct its frequency standard so as to put it in line with that of the base station. The signal sent by the base station for these purposes are (a) frequency correction bursts and (b) synchronization bursts. A burst is defined as an interval within which the radio frequency carrier is modulated by a predetermined data stream. For such data a time slot is divided into 156.26 bit periods and the bits are numbered so that the timing of a burst within a time slot can be defined in terms of bit number. GSM 05.02 defines four full bursts of a useful duration of 147 bits and one short burst of a useful duration of 87 bits. The document just mentioned shows that a frequency correction burst (FB) begins with three tail bits, follows with 142 fixed bits and three more tail bits, with the remainder of the time providing a guard interval. The tail bits are zeroes and the "fixed bits" also, so that this burst is equivalent to an unmodulated carrier with a frequency offset above the nominal carrier frequency.

A synchronization burst begins with three tail bits, followed by 39 encrypted bits and then 64 extended training sequence bits, followed by encrypted bits, tail bits and a guard interval. The extended training sequence bits are a particular pattern of ones and zeroes.

The timing of time slots, TDMA frames, traffic channel frames and control channel frames are all related to a common set of counters which run continuously whether the mobile station and base station are transmitting or not. Thus once the mobile station has determined the correct setting of these counters all its processors are synchronized to the currently serving base station. The mobile station times its transmissions to the base station in line with those received from the base station. The base station sends to each mobile station a timing advance parameter according to the perceived round trip propagation delay. The mobile station advances its timing by this amount, with the result that signals from different mobile stations arriving at the base station are compensated for propagation delay.

The timing state of the signals transmitted is defined by the following counters:

quarter bit number QN (**0-624**)
bit number BN (**0-156**)
time slot number TN (**0-7**)
TDMA frame number FN (**0-22715647**)

QN increments every 12/13 microsecond, BN is the integer part of QN/4, TN increments whenever QN changes from count 624 to 0 and FN increments whenever TN changes from count 7 to 0.

The mobile station can use a timing of the receipt of the synchronization burst to set up its time base counters as follows:

QN is set by the timing of the training sequence,
TN=0 when the sync burst is received, has a particular value (set forth in GSM rec. 05.10 page 3) when the sync burst is received.

GSM recommendation 05.10 pages 4 and 5 sets very strict requirements regarding the carrier frequency transmitted by the mobile station and the accuracy to which the mobile station shall keep its internal time base

in line with that of signals received from the base station.

SUMMARY OF THE INVENTION

It is an object of the invention to provide a synchronization method that fulfills all the requirements of digital information transmission with the least possible technical complication and expense.

The synchronization method of the invention is based on the evaluation of a continuously running phase angle, which is calculated again and again from an in-phase component I and a quadrature component Q. The type of modulation used in the D-Network is Gaussian minimum shift keying (GMSK), in which a linear filter having a pulse response of Gaussian shape continuously reproduces discontinuous transitions from one to the other of the frequency modulation waves and thereby provides a saving of transmission bandwidth by providing continuity in place of the discontinuities of the transitions. The resulting transition wave form can be resolved into varying contents of I and Q components, relative, for example, to one of the two symbol (bit value) frequency waves.

Briefly, in order to take advantage of that more economical synchronization technique, there is performed for the mobile radiotelephone, first, an initial synchronization, then a normal synchronization and then, an extended synchronization as a background procedure during normal operation. The initial synchronization is divided into following steps:

(1.1) coarse frequency synchronization,
(1.2) coarse frame synchronization,
(1.3) fine frequency synchronization, and
(1.4) fine frame synchronization.

The normal synchronization comprises the steps of:

(2.1) frame synchronization with fine frequency synchronization and
(2.2) a preliminary processing of a data signal. The extended synchronization comprises of
(3.1) a coarse frame synchronization and
(3.2) a fine frame synchronization with fine frequency synchronization.

By this procedure it is possible to realize synchronization of higher precision with a relatively small complication and expense.

The method of the invention is based on evaluation of phase angle many times per bit interval. An evaluation is calculated from each of the individual I,Q value pair samples. By such means the synchronous condition is very rapidly reached.

It is also possible, in accordance with the invention, for the precision of the coarse frequency synchronization to be variable across the phase tolerance region (TR). It can be useful in the practice of the invention for the upper boundary phase value to be represented by the binary sequence 0000. . . and the corresponding lower boundary for the phase angle by the binary sequence 0101. . . , these sequences being continued for a number of bits which depends on the desired resolution of phase angle measurement.

It is also useful for the coarse frame synchronization to take place by evaluation of a frequency correction burst and, also, to perform that evaluation from the phase difference values of neighboring paired phase values by a linear regression of a regulating magnitude proportional to the frequency shift.

BRIEF DESCRIPTION OF THE DRAWINGS

Further details of the invention are described below by way of illustrative example with reference to the annexed drawings, in which:

FIG. 1 is a schematic representation of the data structure of a TDMA frame during sync time slots providing for a frequency correction burst **12**, an extended sync burst **13** and a normal burst **14**;

FIG. 2 is a circuit block diagram of a receiver-and-equalizer unit of a mobile radio communication station;

FIG. 3 is a graph showing the course of opposite extreme phase values, plotted against a digital bit sequence at the sampling rate rhythm; and

FIG. 4A and FIG. 4B respectively show the theoretically determined phase course (A) and a measured phase course (B) of an extended training sequence of a synchronization burst identified in FIG. 1; and

FIG. 5 is a graph of a corrected phase course of a frequency burst.

DESCRIPTION OF THE ILLUSTRATIVE EMBODIMENTS

As is evident from the explanation above, the relative size of contemporary I and Q components of a GMSK wave provides a series of phase angles that identifies a rate of change of phase angle that progresses at a known rate when the tuning is of a received signal that is in synchronism with a transmitted signal, regardless of the modulation of a GMSK wave. The relative magnitudes of the I and Q components will change when sampled at many times per data bit length. The relative I and Q magnitudes (i.e. the proportion) in each case define a phase angle. Transitions from 0 to 1 and from 1 to 0 of GMSK modulation, as well as synchronization procedures, result in changing phase angles. Comparison of the phase angles calculated from successive I, Q sample value pairs with a reference phase angle which advances by 90° per MSK data bit interval, which is readily calculated in parallel, provides an error signal for maintaining synchronism of the mobile station frequency with the base station frequency.

As shown in FIG. 1, a Time Division Multiple Access (TDMA) frame **10** contains eight time slots **11**. This complies with GSM recommendation 5.02.

It is desirable to explain the basic construction of the receiving portion of a mobile telephone, with reference to the block circuit diagram of FIG. 2 before further describing the course of the synchronization procedure.

In FIG. 2 there is schematically shown a radio antenna **20** connected to the input of a high frequency reception portion **21** of a radio receiver. A baseband converter **22** is connected to follow the output of the high frequency reception portion and has two outputs **23** and **24** respectively for the I and Q signal voltages. These two outputs are connected to corresponding inputs of an analog-to-digital converter **25** which has an output **26** that deliver a serial digital data signal. This output **26** is connected with an input of an equalizer unit **27** which consists of a synchronization processor **28** and a distortion-compensating and demodulating processor **29**. Following the equalizing unit **27** there is connected a signal processing unit **30**. A central control unit **31** is in two-way connection with the stages **21, 22, 25, 27** and **30**.

The manner of operation of the mobile radiotelephone shown in FIG. 2 is as follows. After the multiple-stage high-frequency conversion of the received signal

in the high frequency receiving portion **21** and a transformation into the baseband by means of the baseband converter **22**, the I and Q components are sampled at a frequency of 270.833 kHz and quantized into eight bit digital signals in the analog-to-digital converter **25**. Only a few of the available 8 bits are necessary for GMSK demodulation. In demodulation performed in a Viterbi decoder, for example, only one bit is obtained for each sampled I, Q pair for producing a serial digital data stream ready for further processing, that being sufficient for practical operation. All the synchronization routines which take place with the help of the synchronizing processor **28** are based on the processing of the phase angles calculated from the I and Q components.

The central control unit **31** prescribes to the synchronization processor **28** which synchronization step is to be activated. The control unit reads out the responses of the synchronization processor, interprets them and supplies the setting values to the corresponding components, as for example a correction for a local oscillator.

The initial synchronization (FIG. **1**), which serves to provide the initial connection between a mobile radiotelephone and a fixed station, includes four steps:

(1.1) coarse frequency synchronization,
(1.2) coarse frame synchronization,
(1.3) fine frequency synchronization, and
(1.4) fine frame synchronization.

Coarse Frequency Determination and Coarse Frequency Synchronization (1.1)

The coarse frequency determination has a burst-independent operation and can thus be subjected to a first frequency estimation after the detection of a carrier frequency by means of the high frequency reception portion **21** of the radio receiver. The result produces information of whether the frequency of the discovered carrier lies within or outside of a tolerance region TR (compare FIG. **3**). The maximal tolerance region is determined by the absolute phase course, with limits respectively resulting from a permanent binary sequence I of the logical value 0, on the one hand, and an alternating binary sequence II of the logic values 0 and 1, with reference to a fixed measurement time. The tolerance region is variable, so that the precision of the frequency estimation increases with a shrinking of the region for any particular data stream (compare FIG. 3 again). With sufficient precision of carrier frequency tuning the coarse frequency determination which is burst-independent can be dispensed with; in consequence the synchronization steps designated **1.2**, **1.3** and **1.4** above then suffice for the initial synchronization.

Coarse Frame Determination and Frame Synchronization (1.2)

In the next synchronization step, the coarse frame determination, it is necessary to detect approximately the frame beginning for a particular channel. For this purpose the frequency correction burst **12** (FIG. **1**) is used. The term "burst" is used in the same sense as in GSM 05.02, signifying a transmission occupying a single time slot. Preceding the active part of every burst are "dummy" bits 111. . . 1 and 3 tail bits 000. These are provided in reverse order after the active part (see GMS rec. 0504). These make sure that the active part of the burst are correctly evaluated. The frequency correction burst has 142 fixed identical bits which signify a phase course, (taking account of and correcting phase progression., rotating N times to reach $N \cdot 2\pi$) having a continuous phase rise by 90° per sample value pair I, Q at the nominal baseband signal frequency (which is desirably the I, Q sampling frequency). Without taking account of continuing phase rotation cycle after cycle, the calculated phase angles in the region from 0 to 2π will have a phase difference of $\pi/2$ between successive I and Q pairs phase values. In that way a simple criterion for the search algorithm for recognition of the beginning of the frequency correction burst **12** is provided, as shown in FIG. **5**.

FIG. **5** shows how the corrected phase course of the received frequency correction burst **12** makes possible the determination of the beginning of a frame. The vertical phase scale is graduated at the bottom in steps of $\pi/2$ radians and at higher levels with specifically designated steps of π or 2π with even-integer multiples $2\pi N$ specifically designated. The horizontal scale is finely graduated in sampling instants of I, Q values and also shows the sets of four successive sampling pulses corresponding to a 2π phase change (complete cycle) of the nominal baseband signal frequency. Each 2π cycle is designated by a numeral (1,2,3. . .) for successive values of N on the horizontal axis.

At the left are unrecognized or unknown data, during which no significant values are found and there N is shown as N=0. When the burst is recognized in the intervals N=1 and N=2, there are fluctuations in the rate of change of phase (poor synchronism) but these are quickly corrected to produce the necessary straight line corresponding to the known linear phase progressive characteristic of the burst.

The sample values repeat every 2π, in straight lines after the correction is made, and then correspond to the steadily rising phase of the burst, as shown in FIG. **5**. That steadily rising line can be calculated back to show that the burst began at the beginning of the interval marked **1** in FIG. **5**. The time region for the coarse estimation of the beginning of the burst is shown below the FIG. **5** graph. From the beginning of the burst, the beginning of a TDMA frame can be determined with reference to the time slot assigned to the mobile telephone, when necessary.

When the I and Q components are measured, the received signal has been converted to the baseband, in which the GMSK frequency modulation represents serial digital data, in which speech or other intelligible data has been encoded. The nominal GMSK carrier frequency, presumably corresponding to a frequency correction burst offset, can desirably be selected, as mentioned above, to generate the sampling rate at four times that nominal frequency for the I, Q measurement pairs, as is shown to be the case in the example of FIG. **5**. The corrections necessary for frequency and phase synchronization may utilize more than one bit of information resulting from an I and Q sample pair. This may multiply the output bit rate of the unit **125** of FIG. **1** and may be implemented by parallel serial outputs.

Fine Frequency Determination and Fine Frequency Synchronization (1.3)

After a successful determination of the beginning of a frame, the oscillator frequency of the mobile telephone needs to be brought more precisely (0.1 ppm) into step with the frequency of the base station. The frequency correction burst **12** is therefore again used, which corresponds to a purely sinusoidal signal lasting for one time slot, of which the continual phase course, from sample

pair value to sample pair value, rises by $\pi/2$ at the nominal frequency.

The algorithm for frequency determination yields the actual phase value from the I,Q sample value pair and provides the difference from the above described reference phase value 90°*—n, in which n, by which 90° is multiplied, is the number of sample pairs. That reference value is calculated in parallel to the actual value determinations. The minimization of the phase difference by a linear regression produces a magnitude proportional to the frequency shift via the slope of the regression straight line. Linear regressions are explained in *Mathematical Methods for Digital Computers* by A. Ralston and H. S. Wilf, published by John Wiley & Sons and in the HP-15C User Manual available from Hewlett-Packard.

Fine Frame Determination and Frame Synchronization (1.4)

The fine frame determination for the bit-precision frame synchronization takes place by the recognition and evaluation of the training sequence in the synchronization burst **13** (FIG. **1** and GSM 05.02 p. 11). A bit-accurate frame determination is possible by a pattern correlation procedure. Correlation is explained in "Digital Communications" by Berndt Sklar (Prentice Hall), a book of the same title by John G. Proakis (McGraw Hill) and "Information Transmission Modulation and Noise" by M. Schwartz (McGraw Hill). The capture region for the frame detection lies in a range of about plus or minus 40 sample pulses. The measurement magnitude corresponds directly to the setting magnitude for bit synchronization required by the central control unit **31**.

FIGS. **4A** and **4B** show the phase course of the training sequence within the synchronization burst **13**. FIG. **4A** shows this phase course A as theoretically calculated and FIG. **4B** shows this phase course B as measured (at the output of the analog-to-digital converter **25**) and calculated from the measured I,Q sample values.

Normal Synchronization (2)

The normal synchronization during operation of the receiver takes place in two steps:

2.1 frame synchronization with fine synchronization

2.2 data signal preliminary processing

With continuous monitoring and maintaining of the frame and frequency synchronism by the evaluation of training sequence within the normal burst **14** (FIG. **1** and GMS 05.02 p. 10) an error free decoding is assured. The encrypted bits designated in FIG. **1** serve to identify the training sequences. In this procedure any frame shift is first determined. The value produced (timing pulse shift) is a necessary parameter in order to mark the pattern sequence with bit-accuracy within the data packet or sentence. This is assumed for the following correct calculation of the correlation for determining the actual (current) frequency status.

Preliminary Data Processing (2.2)

A frequency correction value produced by the central control unit **31** from the actual (current) frequency measurement is supplied to the synchronization processor **28**. By means of this preprocessing of the data signal any impairment of error-free decoding in the case of frequency shifts exceeding 200 Hz is completely eliminated. Such frequency shifts are to be expected from the Doppler effect and from oscillator drift.

Extended Synchronization (3)

Extended synchronization is needed to provide synchronization of a mobile radiotelephone to neighboring cells of a cellular mobile radio communication system as a cell boundary is approached and crossed. It is also carried out in two steps:

3.1 coarse frame synchronization

3.2 fine frame synchronization with fine frequency synchronization.

By means of this extended synchronization certain special cases of initial synchronization are avoided. In this case it is basically assured that upon leaving one radio cell the base station of that cell will not interfere with the continuation of the connection.

In order to assure that synchronization is not lost during a change of a radiotelephone from one radio cell to a neighboring radio cell, extended synchronization is provided in normal operation as a background procedure (process having lower priority) which produces the necessary synchronization parameters (frame and frequency shift) for the nearby cell in contemplation of a crossing of a cell boundary. As a result, the control unit **31** can assure that a connection will be preserved in going from one cell to another. In particular, the synchronization procedure during normal operation performs a coarse frame synchronization (frequency burst beginning) and a fine frame synchronization with fine frequency synchronization in which the synchronization burst **13** is used for the frame and frequency synchronization.

The relevant algorithms for the above steps correspond essentially to those designated **1.2, 1.3, 1.4** and **2.1** above, although more bits are involved in the extended training sequences (FIG. **1**).

By measuring phase angles, especially at four times the frequency of a nominal baseband frequency which carries GMSK modulation, and comparing them with a locally generated comparison signal of steadily increasing phase angle, a mobile radio station can utilize the frequency burst signals transmitted by a base radio station much more economically to synchronize a mobile radio station with a base station for receiving and transmitting than by means of maintaining mobile time base counters as recommended by GSM rec 05.10. For taking best advantage of evaluating phase angles by I. Q samples, it is important to utilize the various different transmitted synchronization bursts in accordance with the various steps that usefully make up the various aspects of the invention.

The invention is not necessarily limited to the GSM system or the D Network and is likely to be useful in more or less similar systems that may be used now or in the future.

Although the invention has bee described with reference to a particular illustrative example, therefore it will be understood that variations and modifications are possible within the inventive concept.

We claim:

1. A method of synchronizing a mobile radiotelephone in a cellular digital mobile radiotelephone network comprising a plurality of fixed radiotelephone stations and a plurality of mobile radio stations operating in accordance with a GSM standard or its equivalent, in which each communication frequency assignment is subdivided into interleaved time slots, a plural-

ity of said time slots together comprising a frame, comprising the following steps which are carried out in the mobile radiotelephone:

(1) conducting an initial synchronization by means of a frequency correction burst substantially fully occupying a time slot with an unmodulated wave corresponding to repetition of bits of the same binary logic value;

(2) maintaining normal synchronization during communication by means of interspersed normal synchronization bursts, each normal synchronization burst containing a training sequence occupying less than a third of a time slot, and

(3) performing extended synchronization during communication as a background procedure by means of interspersed frequency synchronization bursts, each frequency synchronization burst containing an extended training sequence occupying less than an entire time slot and more than a third of a time slot, and wherein:

said step of conducting said initial synchronization comprises the substeps of:

(1.1) conducting a coarse frequency synchronization,

(1.2) conducting a coarse frame synchronization over a plurality of said time slots which comprise a frame,

(1.3) conducting a fine frequency synchronization, and

(1.4) conducting a fine frame synchronization over said plurality of time slots which comprise a frame;

said step of maintaining said normal synchronization comprises the substeps of:

(2.1) conducting a frame synchronization with fine frequency synchronization, and

(2.2) carrying out preliminary data signal processing; and

said step of performing said extended synchronization comprises the substeps of:

(3.1) conducting a coarse frame synchronization, and

(3.2) conducting a fine frame synchronization with fine frequency synchronization.

2. The synchronization method of claim 1, wherein there is performed in the mobile radiotelephone the further steps of:

calculating (continuous evaluation of) a phase angle from sequences of pairs of values each including an in-phase value (I) and a quadrature value (Q); and

thereafter performing a continuous evaluation of said calculated phase angle.

3. The synchronization method of claim 2, wherein the precision of said coarse frequency synchronization step is variable by setting a phase tolerance region (TR).

4. The synchronization method of claim 3, wherein said phase tolerance region (TR) has a maximum value provided by a phase angle corresponding to an upper phase value represented by a binary bit sequence 0000. . . and a lower phase value represented by a binary bit sequence 0101. . . .

5. The synchronization method of claim 2, wherein the fine frequency synchronization step comprises evaluating said frequency correction burst (12).

6. The synchronization method according to claim 5, wherein the step of evaluating said frequency correction burst (12) for fine frequency synchronization comprises by producing a regulation magnitude proportional to a frequency deviation from phase difference values of neighboring phase values by means of a linear regression.

7. The synchronization method of claim 2, wherein the step of fine frame synchronization comprises a step of recognizing and evaluating said extended training sequence of said frequency synchronization bursts.

8. The synchronization method of claim 7, wherein the step of recognizing said extended training sequence comprises conducting a pattern correlation procedure on said frequency synchronization bursts.

9. The synchronization method of claim 2, wherein the step of conducting said frame synchronization with fine frequency synchronization comprises recognizing and evaluating said training sequence within a normal synchronization burst (14).

10. The synchronization method of claim 2, wherein the step of conducting said frame synchronization comprises conducting a pattern correlation procedure and initial frequency synchronization by evaluating said frequency correction burst by producing a regulation magnitude proportional to frequency deviation for a central control unit from phase difference values of neighboring phase values by means of a linear regression.

11. The synchronization method of claim 2, wherein said extended synchronization takes place with reference to neighboring cells during normal radio communication by means of a coarse frame synchronization and thereafter a fine frame synchronization with fine frequency synchronization by recognizing and evaluating said extended training sequence of said frequency synchronization burst (13).

12. The synchronization method of claim 11, wherein the step of performing said extended synchronization is carried out at a lower priority with respect to normal synchronization during communication.

13. The synchronization method of claim 2, wherein said step of preliminary data signal processing during said step of maintaining normal synchronization comprises preliminary processing of said in-phase (I) and quadrature phase (Q) sample values for eliminating a frequency offset.

* * * * *

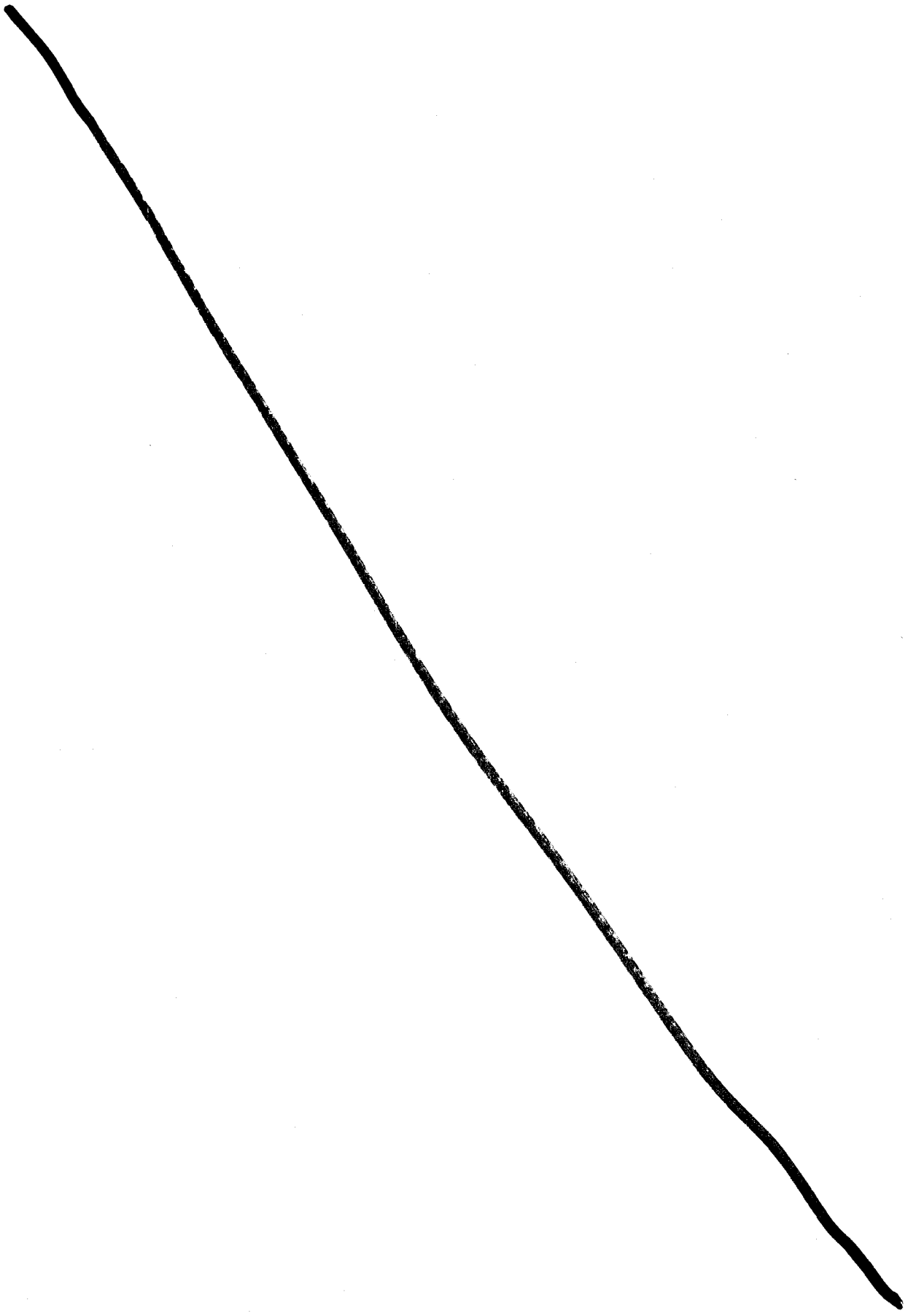


EXHIBIT "B"

US006535750B1

(12) **United States Patent**
Van Gen

(10) **Patent No.: US 6,535,750 B1**
(45) **Date of Patent: *Mar. 18, 2003**

(54) **RADIO APPARATUS, ESPECIALLY A MOBILE TELEPHONE**

(75) Inventor: **Kay Hassend Van Gen**, Kamen (DE)

(73) Assignee: **Robert Bosch GmbH**, Stuttgart (DE)

(*) Notice: This patent issued on a continued prosecution application filed under 37 CFR 1.53(d), and is subject to the twenty year patent term provisions of 35 U.S.C. 154(a)(2).

Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/186,403**

(22) Filed: **Nov. 4, 1998**

(30) **Foreign Application Priority Data**

Nov. 6, 1997 (DE) 197 49 069

(51) **Int. Cl.**[7] **H04B 1/08**; H04B 1/38; H04Q 7/20; H04M 1/00

(52) **U.S. Cl.** **455/558**; 455/347; 455/348; 455/349; 455/425; 455/550; 455/572; 455/90; 455/575; 379/433.01; 379/433.08; 379/433.09

(58) **Field of Search** 455/90, 558, 572, 455/575, 186.1, 347–349, 425, 550; 235/479; 379/433, 428, 428.01, 433.06, 433.08, 433.09, 433.11, 433.12

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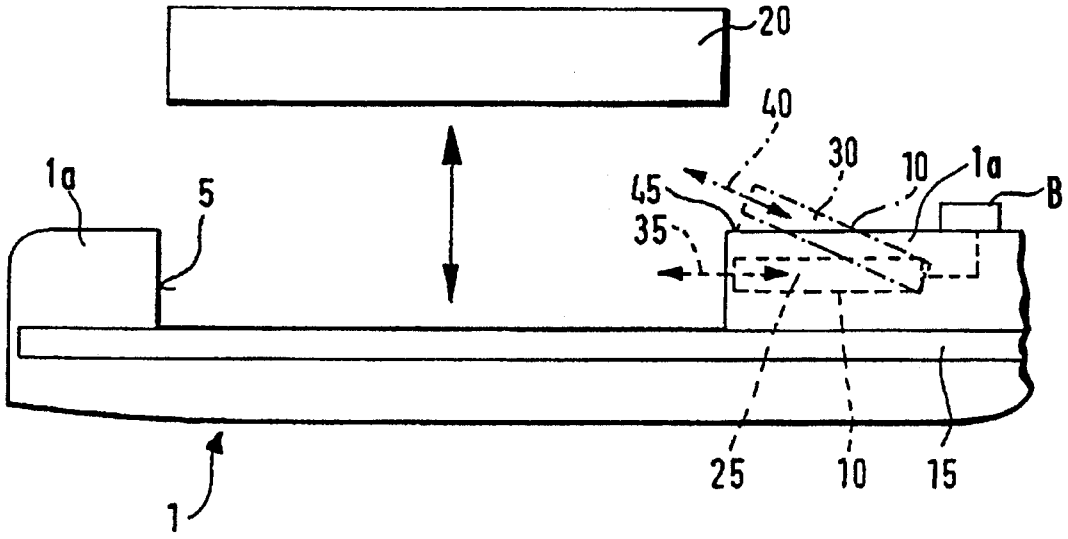
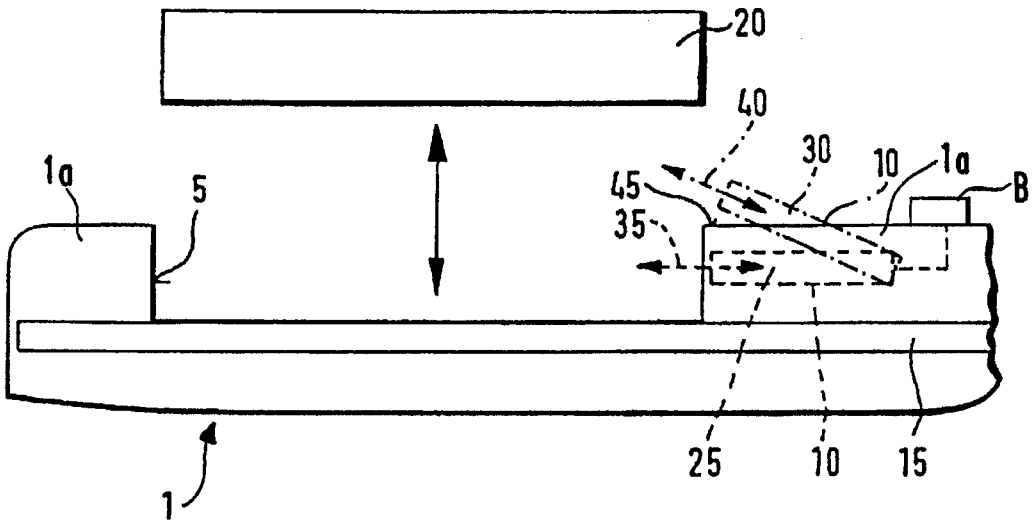
Primary Examiner—Edward F. Urban
Assistant Examiner—Meless Zewdu
(74) *Attorney, Agent, or Firm*—Michael J. Striker

(57) **ABSTRACT**

The mobile or portable telephone includes a circuit board **(15)**; a battery compartment **(5)** for a battery **(20)** located on a first side of the circuit board **(15)** and a pivotable card receptacle **(10)** for a telephone card arranged on the first side of the circuit board **(15)** next to the battery compartment. The card receptacle **(10)** is pivotable between a first position **(25)** in which the telephone card cannot be inserted or removed from the card receptacle when the battery **(20)** is in the battery compartment **(5)** and a second position **(30)** in which the telephone card is insertable or removable from the card receptacle even when the battery **(20)** is in the battery compartment **(5)**. A button (B) may be provided for activation of the pivoting of the card receptacle into the second position from the first position. The card receptacle **(10)** preferably locks in the first position **(25)** when put in the first position and may be unlocked from the first position **(25)** by operation of the button (B).

2 Claims, 1 Drawing Sheet




20
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1

RADIO APPARATUS, ESPECIALLY A MOBILE TELEPHONE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a radio apparatus, especially to a mobile or portable telephone, with a battery compartment and a card receptacle.

2. Prior Art

A radio device constructed as a mobile telephone including a battery compartment and a telephone card receptacle for a SIM telephone network card (subscriber identification module) is already known from the Bosch Telecom Catalog "Bosch Mobile Telephone 1996/97, Fresh Ideas for Maintaining Connections". The SIM telephone network card allows telephoning in the respective mobile radio network. It contains the personal call number and a protective access authorization code, for example in the form of a four-digit number, whose input to the mobile telephone proves that the user of the telephone network card is authorized to make telephone calls. The SIM telephone network card is also a memory, e.g. for telephone directory entry.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide an improved radio device, especially a mobile or portable telephone, of the above-described type, having a battery compartment and a telephone card receptacle.

According to the invention the compact radio device, especially a mobile or portable telephone, includes a circuit board, a battery compartment for holding a battery that e.g. powers the radio device and a card receptacle for a telephone card, such as a telephone network card, an access authorization card or the like. The battery compartment and the card receptacle are arranged on the same side of the circuit board and along the circuit board next to each other.

The radio device according to the invention with the above-described features has the advantage that the battery compartment and the card receptacle are on the same side of the circuit board and are arranged next to each other on the circuit board. In this way it is possible to reduce the thickness of the radio device. Because of that the user-friendliness of the radio device is increased, since it is more easily gripped by a hand of the user and takes up less space, for example in a jacket pocket.

Especially a reduced thickness or height of the radio device according to the invention results in comparison to an arrangement of the card receptacle between the battery compartment and the circuit board.

An additional advantage of the above-described arrangement is that the arrangement of the battery compartment and the card receptacle next to each other along the circuit board is that the battery compartment and the card receptacle are simultaneously accessible from outside in contrast to the situation with the card receptacle between the battery compartment and the circuit board and the card receptacle thus is accessible from the outside only with the battery removed from the battery compartment. The insertion or removal of a telephone network card or an access authorization card into or out of the card receptacle is thus considerably simplified for the user.

The features of an advantageous embodiment of the radio device according to the invention are set forth in the appended dependent claims.

The card receptacle is advantageously only accessible from the battery compartment with the battery removed. By removing the battery it is guaranteed that no voltage is present in the radio device when the card is inserted in it. Because of that damage to the radio device and/or the card is prevented. Furthermore a telephone network card inserted in the card receptacle or access authorization card is better protected from unintended loss or dropping out from the radio device, since it is only insertable or removable with the battery removed from the battery compartment. At the same time with this arrangement a telephone network card or access authorization card inserted in the card receptacle is better protected from outside influences, such as weather influences, impacts or the like. Furthermore by the arrangement of the battery compartment and the card receptacle along the circuit board on one side a hinge visible from the outside can be dispensed with, whereby the outer appearance of the radio device is not made to look poorer or interrupted.

BRIEF DESCRIPTION OF THE DRAWING

The objects, features and advantages of the invention will now be illustrated in more detail with the aid of the following description of the preferred embodiments, with reference to the accompanying drawing in which the sole FIGURE is a side view of the radio device according to the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The radio device shown in the sole FIGURE is, for example, a mobile telephone. However the radio device **1** could also be a cordless telephone, a portable radio unit, a voice radio unit or the like. The radio device **1** has a housing **1***a*, a circuit board **15** within the housing, a battery chamber or battery compartment **5** in the housing and a card receptacle **10** for receiving a telephone network card, an access code card or the like. The telephone network card can be a SIM telephone card (Subscriber Identification Module). This type of subscriber identification module card allows the telephoning in a respective network, contains a call number of the radio unit **1** and a protective access code, for example in the form of a four-digit number, whose insertion through an upper surface of the radio device proves that the user of the SIM telephone network card is authorized to make telephone calls. It can also include a memory, e.g. for recording telephone directory entries. The SIM telephone network card is also preferably a chip, but can alternatively or additionally include a magnetic strip or other similar memory module. An unshown card reading device is provided for reading the telephone network card, access code card or the like inserted in the card receptacle **10**.

The battery compartment **5** and the card receptacle **10** are arranged in the housing **1***a* of the mobile telephone on the same side of the circuit board **15** as shown in the drawing. The battery compartment **5** and the card receptacle **10** are arranged next to each other along the circuit board **15**.

Two different main embodiments are possible for formation of the card receptacle **10**. First the card receptacle **10** can be formed so that it is accessible from the outside only after removal of a battery **20** from the battery compartment **5**. The card receptacle **10** is arranged in a first position **25** in a plane that extends approximately parallel to the circuit board **15** so that inserting and removing the card according to a first double arrow **35** is only possible through the neighboring battery compartment **5**. Thus when the battery **20** is inserted in the battery compartment **5** the card receptacle **10** is not accessible for inserting or removing the card through the battery compartment in its first position **25**.

In a second embodiment the card receptacle **10** in the radio device **1** can be pivoted out from the housing **1***a*, i.e. from the first position **25** to a second position **30**, so that insertion or removal of the card into or from the card receptacle **10** in the directions indicated by the double arrow **40** is possible in the second position, even with the battery **20** inserted in the battery compartment **5**, since the card receptacle or socket **10** is accessible in the second position **30** from above an upper surface **45** of the housing **1***a*, but not via the battery compartment **5**.

The card receptacle or socket **10**, for example, can be in the form of a drawer, so that the insertion or removal of a telephone card, such as telephone network card, an access authorization card or the like, to or from the card receptacle **10** is easy for the user. If necessary an ejection mechanism can also be provided for the card receptacle **10**, which for example conveys an inserted card by pressure on the card receptacle **10** into a card removal position, from which it can be easily removed by the user. A button B (see figure) accessible from the outside can, for example, be provided for the pivoting motion required of the card receptacle **10** for insertion or removal of the card in the second embodiment. The card receptacle **10** can be pivoted from the second position **30** into the first position **25**, for example, by the user pressing in the card receptacle **10** from the second position **30** to the first position **25**, whereby the card receptacle **10** then locks into the first position **25**.

Since the card receptacle or socket **10** currently has a spatial requirement of about 3 mm in thickness, a saving in thickness of the radio device **1** in contrast to an arrangement of the card receptacle between the circuit board **15** and the battery compartment **5** of about 3 mm in thickness is provided.

The disclosure in German Patent Application 197 49 069.7-31 of Nov. 6, 1997 is incorporated here by reference. This German Patent Application describes the invention described hereinabove and claimed in the claims appended hereinbelow and provides the basis for a claim of priority for the instant invention under 35 U.S.C. 119. While the invention has been illustrated and described as embodied in a radio apparatus, especially a portable telephone, it is not intended to be limited to the details shown, since various

modifications and changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can, by applying current knowledge, readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention.

What is claimed is new and is set forth in the following appended claims.

I claim:

1. A mobile or portable telephone comprising

a housing having an outer surface;

a circuit board arranged within the housing;

a battery compartment for a battery, said battery compartment being located in the housing and on a first side of said circuit board;

a pivotable card receptacle for a telephone card arranged in the housing and on said first side of said circuit board next to said battery compartment; and

a button for pivoting said card receptacle, said button being accessible from outside of said housing;

wherein said card receptacle is pivotable by means of said button from a first position under the outer surface of the housing in which said telephone card cannot be inserted or removed from said card receptacle, when said battery is in said battery compartment, to a second position in which said card receptacle extends outside of said housing so that said telephone card is insertable or removable from said card receptacle, when said battery is in said battery compartment; but wherein said telephone card can be inserted or removed from said card receptacle in both said first position and said second position when said battery is not in said battery compartment.

2. The mobile or portable telephone as defined in claim **1**, wherein the card receptacle locks in said first position when put in said first position by pressing said card receptacle into said first position and is unlocked from said first position by means of said button.

* * * * *

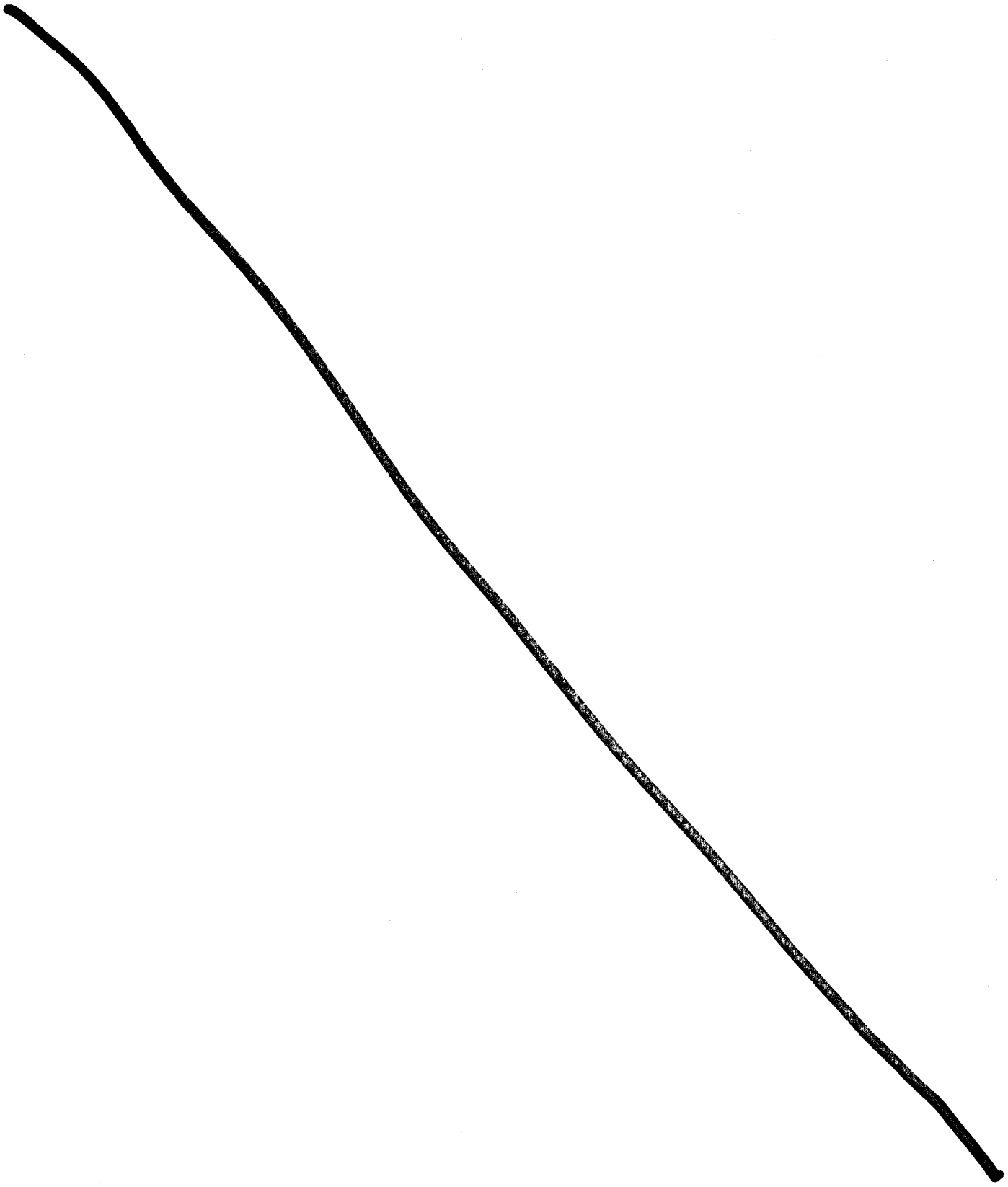

EXHIBIT "C"

US006987980B1

(12) **United States Patent**
Hans et al.

(10) **Patent No.: US 6,987,980 B1**
(45) **Date of Patent: Jan. 17, 2006**

(54) **TRANSMISSION FRAME AND RADIO UNIT FOR TRANSMITTING SHORT MESSAGES WITH DIFFERENT DATA FORMAT**

(75) Inventors: **Martin Hans**, Hildesheim (DE); **Frank Kowalewski**, Salzgitter (DE); **Holger Schulz**, Berlin (DE); **Ralf Fischer**, Bad Salzdeltfurth (DE); **Gunnar Schmidt**, Wolfenbuettel (DE)

(73) Assignee: **Robert Bosch GmbH**, Stuttgart (DE)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/857,805**

(22) PCT Filed: **Oct. 16, 1999**

(86) PCT No.: **PCT/DE99/03328**

§ 371 (c)(1),
(2), (4) Date: **Jun. 11, 2001**

(87) PCT Pub. No.: **WO00/35214**

PCT Pub. Date: **Jun. 15, 2000**

(30) **Foreign Application Priority Data**

Dec. 8, 1998 (DE) 198 56 440

(51) **Int. Cl.**
H04Q 7/08 (2006.01)
H04Q 7/20 (2006.01)

(52) **U.S. Cl.** **455/466**; 455/38.1; 370/313; 370/825.03; 379/57

(58) **Field of Classification Search** 455/466, 455/434, 414.3, 458, 38.1; 340/7.1, 7.43, 340/7.48; 370/473, 474, 313, 825.03, 829, 370/85.6; 379/57, 59, 60
See application file for complete search history.

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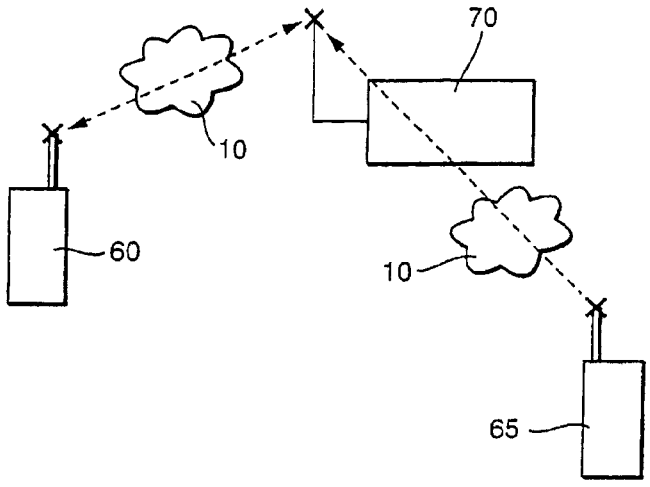
Primary Examiner—Jean Gelin
Assistant Examiner—Julio Perez
(74) *Attorney, Agent, or Firm*—Michael J. Striker

(57) **ABSTRACT**

A transmission frame and a telecommunications device **(60, 65, 70)** having a transmission frame **(1)** are proposed, which are used to transmit short messages **(5)** in a telecommunications network **(10)**, in particular in a radiotelecommunications network. By means of the transmission frame **(1)**, especially flexible transmission of short messages **(5)** in the telecommunications network **(10)** is possible. At least two data fields **(15, 20, 25, 30)** are provided. Data of a short message **(5)** are stored in memory in the data fields **(15, 20, 25, 30)**. Data in a first data format are stored in a first data field **(15)**, and data in a second data format, different from the first data format, are stored in a second data field **(20)**.

9 Claims, 1 Drawing Sheet



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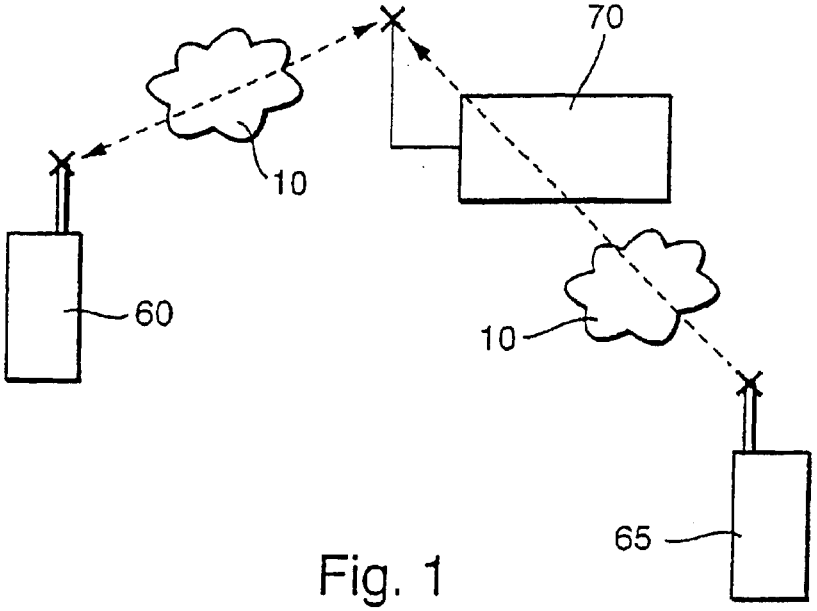

Fig. 1

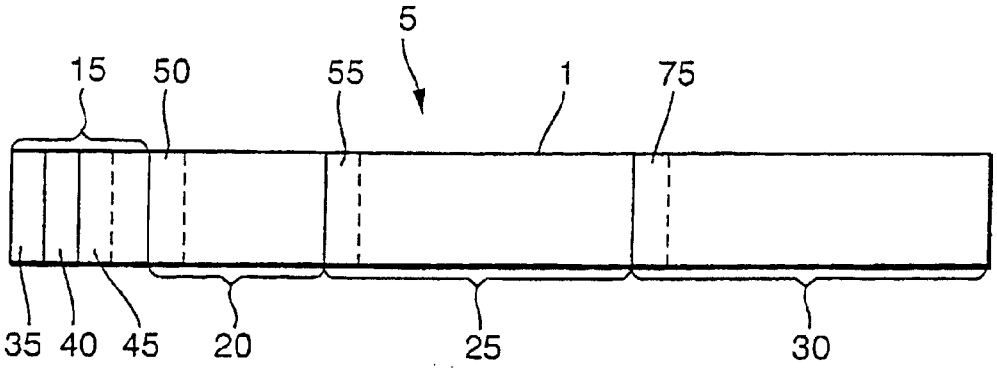

Fig. 2

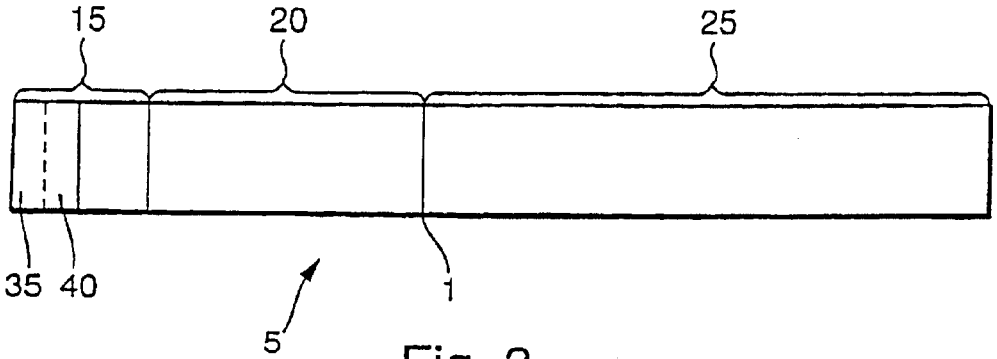

Fig. 3

TRANSMISSION FRAME AND RADIO UNIT FOR TRANSMITTING SHORT MESSAGES WITH DIFFERENT DATA FORMAT

BACKGROUND OF THE INVENTION

The invention is based on a transmission frame and a telecommunication device having the transmission frame.

Short message services for transmitting short messages are already known. The short message services serve to send a short message to a subscriber of a telecommunications network without requiring that a telecommunications connection to the subscriber be made beforehand. This is of particular interest in mobile radio systems, since subscribers in such systems are often unreachable. Incoming short messages are stored in memory by a network operator of the telecommunications network and forwarded to the intended subscriber at a later time. The subscriber is informed of the arrival of a short message intended for him so that he can download the short message from the network operator.

One example of a short message service is the Short Message Service (SMS) using the GSM Standard (Global System for Mobile Communications). This short message service predetermines a transmission frame for transmitting a short message of up to 160 7-bit ASCII (American Standard Code for Information Interchange) text characters.

Transmitting longer texts is possible with the aid of chained short messages. With the aid of this short message service, it is possible to produce and read the short messages even using simple mobile radio terminals. Since by the GSM Standard provision is made only for text transmission for the short messages, if binary data, such as audio data, image data or the like, are to be transmitted, they would have to be converted into the text format and converted back again into the binary format after being received.

SUMMARY OF THE INVENTION

The transmission frame of the invention and the telecommunications device of the invention have the advantage over the prior art that at least two data fields are provided; that data of a short message are stored in memory in the data fields; and that data in a first data format are stored in a first data field, and data in a second data format, different from the first data format, are stored in a second data field. In this way, a short message that includes different types of data can be transmitted in a single transmission frame. Thus different media, such as text data, audio data and image data, can be integrated into a single short message in a simple way, making it possible to form a multimedia short message.

A further advantage is that the transmission frame is not limited in its length; instead, arbitrary data fields can be transmitted, lined up with one another, in the transmission frame.

Another advantage is that by lining up the data fields, a simple separation or downloading of the data of a single data field or medium having text, audio, or image data is made possible. Since thus only the actually required part of the short message has to be downloaded by the network operator of the telecommunications network, an economy of transmission capacity can be achieved.

By the provisions recited in the dependent claims, advantageous refinements of and improvements to the transmission frame defined by independent claim **1** are possible.

It is especially advantageous that a first ID code, which identifies the makeup and/or the content of the short message, is provided in the first data field. In this way, a subscriber to whom the short message is addressed can be informed especially easily of the makeup and/or content of the short message if the network operator of the telecommunications network transmits merely the first data field to the intended subscriber. Based on this information, the intended subscriber can then decide which parts of the data fields of the short message he would like to download from the network operator of the telecommunications network.

Another advantage is that the first data field is limited in its size to a predetermined value. Thus even a subscriber with limited storage capacity for receiving short messages can be informed of the makeup and/or content of the entire short message by transmission of the first data field.

Another advantage is that the total length of the short message is not limited.

It is also advantageous that in each of at least two data fields, one data-field-specific ID code, which identifies the makeup and/or content of the corresponding data field, is provided per data field. In this way, a notice about the makeup and/or content of the entire short message can also be generated by combining all the data-field-specific ID codes and sending them to the intended subscriber, so that the first data field, above all in the case of a size limitation, will not be overfilled with ID code data.

By means of the data-field-specific ID code, the intended subscriber on downloading the associated data field from the network operator can be informed still more precisely about this data field and can thus better adapt a playback of the data transmitted with the data field to his own playback capabilities.

It is especially advantageous that the data stored in the first data field are present in a data format that is readable by all the subscribers of the telecommunications network. In this way, short messages can be sent at least in part to all the subscribers of the telecommunications network. Furthermore, all the subscribers can at least be informed of the short messages on hand in the network operator, even if they are unable to read certain data fields of the short message intended for them.

BRIEF DESCRIPTION OF THE DRAWINGS

One exemplary embodiment of the invention is shown in the drawing and described in further detail in the ensuing description.

FIG. **1** shows a block circuit diagram for transmitting short messages in a telecommunications network;

FIG. **2** shows a general makeup of a transmission frame; and

FIG. **3** shows one concrete example of a makeup of a transmission frame.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

In FIG. **1**, **60** designates a first subscriber and **65** a second subscriber of a telecommunications network **10**, which is embodied in particular as a radiotelecommunications network, for example as a mobile radio network. The first subscriber **60** and the second subscriber **65** are each embodied as a telecommunications device, in particular as a radio unit, for example as a mobile radio device, service radio device, as a radio handset, or the like. In FIG. **1**, a network operator **70** of the telecommunications network **10** is also shown; it can also be embodied as a telecommunications device, and in particular as a radio unit.

In the second subscriber **65**, a short message **5** for the first subscriber **60** is prepared and is broadcast, suitably addressed, to the network operator **70** via the telecommunications network **10**. The network operator **70** stores the short message **5** in memory and sends a message to the first subscriber **60** informing the subscriber about the presence of a short message **5** addressed to it. This message can be sent to the first subscriber **60** for example once the network operator **70** ascertains an activation of the first subscriber **60**. If after receiving the aforementioned message the first subscriber **60** asks the network operator **70** to transmit the short message **5**, then the network operator **70** first sends a notice to the first subscriber **60** that informs the first subscriber **60** of the makeup and/or content of the short message **5**. The first subscriber **60** can then download the short message **5** either partially or entirely from the network operator **70**, so that the short message **5** is transmitted partially or completely by the network operator **70** to the first subscriber **60**.

In FIG. **2**, the makeup of a short message **5** of this kind is shown. The short message **5** is transmitted in a transmission frame **1** from the second subscriber **65** to the network operator **70**. The transmission frame **1** includes a first data field **15**, a second data field **20**, and optionally a third data field **25** and a fourth data field **30**. The first data field **15** includes a first ID code **35**, which identifies the makeup of the short message **5**. In addition, a second ID code **40**, which identifies the content of the short message **5**, can be provided in the first data field **15**. The first ID code **35** and the second ID code **40** can also be combined into a single ID code that identifies the makeup and/or content of the short message **5**. Also stored in the first data field **15** are data in a first data format. In the second data field **20**, data in a second data format, different from the first data format, are stored. Data whose data format can differ from the data format of the first data field **15** or the second data field **20**, but need not necessarily do so, are also stored in the optionally present further data fields **25**, **30**.

If more than two data fields are provided in the transmission frame **1**, then data in different formats are stored at least in two of the data fields, but the position of these data fields in the transmission frame **1** does not matter.

Dashed lines in FIG. **2** indicate that the first data field **15** can additionally include a first data-field-specific ID code **45**, which identifies the makeup and/or content of the first data field **15**. Correspondingly, the second data field **20** can include a second data-field-specific ID code **50**, which identifies the makeup and/or content of the second data field **20**. The third data field **25** can correspondingly include a third data-field-specific ID code **55**, which identifies the makeup and/or content of the third data field **25**, and the fourth data field **30** can include a fourth data-field-specific ID code **75**, which identifies the makeup and/or content of the fourth data field **30**.

The first ID code **35** can include indications about the number of data fields **15, 20, 25, 30** in the short message **5**. In addition or as an alternative, the first ID code **35** can include data about the data formats of the data stored in the data fields **15, 20, 25, 30**. In addition or alternatively, indications about the size of the data fields **15, 20, 25, 30** can be included in the first ID code **35**. In that case, the second ID code **40** can include indications about the type of data stored in the data fields **15, 20, 25, 30**. For instance, the second ID code **40** can include indications as to whether audio data or image data are stored in a data field.

It can now be provided that the network operator **70**, upon the request of the first subscriber **60**, will forward the first data field with the first ID code **35** and the second ID code **40** to the first subscriber **60**, so that on the basis of the information, transmitted in the first ID code **35** and the second ID code **40**, about the makeup and/or content of the short message **5**, the first subscriber **60** can check which data fields of the short message **5** it is capable, on the basis of **20**, its functionality, of downloading and/or playing back from the network operator **70**. Also in the first subscriber **60**, a decision can be made as to which of the readable data fields of the short message **5** are to be downloaded at all from the network operator **70**, if not all the readable data fields of the short message **5** are of interest to the first subscriber **60**, for the sake of economy of transmission capacity. If by the request of the first subscriber **60** the entire first data field **15** with the first ID code **35** and the second ID code **40** is to be transmitted to the first subscriber **60**, then it should as much as possible be assured that the data stored in the first data field **15** are in a data format that is readable by all the subscribers of the telecommunications network **10**. This is true particularly whenever the data stored in the first data field **15**, together with the data in the first ID code **35** and in the second ID code **40**, are in a text format; the SMS (Short Message Service) format by the GSM Standard (Global System for Mobile Communications), for instance, is attractive, since it is readable, in a telecommunications network embodied by the requirements of the GSM system, by the subscribers or mobile radio devices of this subscriber that are embodied by the GSM Standard. Then the first data field **15** can correspond to the data field already prescribed for the SMS by the GSM Standard and can be limited in its size to the 160 7-bit ASCII (American Standard Code for Information Interchange) text characters. The other data fields **20, 25, 30** need not be limited in their size.

A further data format for the first data field **15**, which is likewise readable, as an alternative to the text format, by all the subscribers of the telecommunications network **10**, is the binary encoding of references to entries in tables of the kind that contain known data formats and are known to all the subscribers of the telecommunications **20**, network **10**.

At least some of the data stored in the first data field **15**, such as the data of the first ID code **35** and/or the data of the second ID code **40**, in that case comprise binary-encoded values that represent the indices of the table entries. In the tables, known data types and/or data formats, such as audio and/or video formats, are assigned to these indices.

The data-field-specific ID codes **45, 50, 55, 75** can also include indications about the data formats in the respective associated data field **15, 20, 25, 30** and/or about the size of the respective associated data field **15, 20, 25, 30** and/or about the type of data in the respective data field **15, 20, 25, 30**. If it is agreed that the data in the first data field **15** are in the GSM-SMS text format, and this data field is limited for instance to 160 7-bit ASCII text characters, then the first data-field-specific ID code **45** can also be omitted. It can be provided that only data in a single data format are stored in each data field **15, 20, 25, 30**. However, it can also be provided that in at least one of the data fields, data in a plurality of data formats are stored, in particular in the second data field **20** and/or optionally in one or more further data fields **25, 30**. Naturally, it can also be provided that the short message **5** includes more than the four data fields shown in FIG. **2**.

It can also be provided that the notice from the network operator **70** to the first subscriber **60**, in response to the request by the subscriber to the network operator **70**, about the makeup and/or content of the short message **5** is prepared by evaluation of the data-field-specific ID codes **45, 50, 55,**

75 and is then sent to the first subscriber **60, 20** so that in this case, the first ID code **35** and the second ID code **40** are not needed, and the first data field **15** does not have to be sent to the first subscriber **60**, either. The notice, generated in this way, about the makeup and/or content of the short message **5** can, however, also be sent to the first subscriber **60** in a data format that is readable by all the subscribers of the telecommunications network **10**; for that purpose, once again, the GSM-SMS text format, using a data field with **160** 7-bit ASCII text characters, can for instance be provided in particular.

A concrete example of a transmission frame **1** for a short message **5** will now be described in conjunction with FIG. **3**. The short message **5** is embodied as a multimedia short message. In FIG. **3**, identical reference numerals identify the same elements as in FIG. **2**. According to FIG. **3**, the first data field **15**, second data field **20** and third data field **25** are provided in the transmission frame **1**. No data-field-specific ID codes are provided in the individual data fields **15, 20, 25**. The first data field **15** includes text data in the ASCII text format; the second data field **20** includes audio data, for instance in the WAV (Wave) format; and the third data field **25** includes image data, for instance in the GIF format (Graphic Interchange Format). The first data field **15** with the text data is text-formatted in accordance with the GSM-SMS. A dashed line between the first ID code **35** and the second ID code **40** in FIG. **3** indicates that the first ID code **35** and the second ID code **40** can be combined into one common ID code. This kind of common ID code **35, 40** indicates both the number of data fields **15, 20, 25** and the content and size of the second data field **20** and third data field **25**. Hence the common ID code **35, 40** can look like this:

"Multipart/2/Audio/7654/Image/12345".

This common ID code **35, 40** states that what is involved is a short message from a plurality of data fields, as indicated by the code word "Multipart". The numeral "2" indicates that besides the first data field **15**, which is always present, having the text data and a length of 160 7-bit ASCII text characters, there are also two further data fields **20, 25** in the transmission frame **1** of the short message **5**. "Audio" is named as the first data type in the common ID code **35, 40**; thus the common ID code **35, 40** tells that the data stored in the second data field **20** are audio data. The second data type is named "Image" in the common ID code **35, 40**; thus the common ID code **35, 40** tells that the data stored in the third data field **25** are image data.

Following the data type in the common ID code **35, 40** is the size of the associated data field **20, 25** in each case, so that the common ID code **35, 40** tells both the length of an audio file having the audio data, transmitted in the second data field **20**, which is 7654 bytes, and the length of an image file with the image data, transmitted in the third data field **25**, which is 12345 bytes. For the first data field **15**, no indications are required in the common ID code **35, 40**, since in the example described, it always includes text data, which are compatible with the GSM-SMS text format and which are limited in number to 160 7-bit ASCII text characters. Provision can additionally be made so that the common ID code **35, 40** also indicates the data format for the data in the second data field **20** and in the third data field **25**. For the audio data in the second data field **20**, the WAV format could then be indicated as a data format in the common ID code **35, 40**. For the image data in the third data field **25**, the GIF format could be indicated as the data format in the common ID code **35, 40**. However, it is also possible that the indications "Audio" and "Image" of the aforementioned common ID code **35, 40** simultaneously describe the content and the format of the data stored in the corresponding data fields **20, 25** as well, in which case it is then a prerequisite that audio data always be present in a predetermined format, such as the WAV format, and image data also always be present in predetermined format, such as the GIF format, in the corresponding data field of the transmission frame **1**.

As described, it is also possible to encode the data type and/or the data format by way of tables known to all the subscribers of the telecommunications network **10**, for instance by means of a binary code. In a first table for data types, the data type "Text Data" can for instance be assigned a numeral "1", the data type "Audio Data" can be assigned the numeral "2", the data type "Image Data" can be assigned the numeral "3", and the data type "Video Data" can be assigned the numeral "4", and the numerals can be suitably binary-encoded. In a second table for data formats of the data type "Audio Data", the data format "WAV" can for instance be assigned the numeral "1", the data format "G.723" can be assigned the numeral "2", the data format "G.728" can be assigned the numeral "3", the data format "MPEG-Audio" (MPEG stands for Motion Picture Expert Group) can be assigned the numeral "4", and the data format "AMR" (Adaptive Multi Rate) can be assigned the numeral "5"; once again, these numerals can be suitably binary-encoded. In a third table for data formats of the data type "Image Data", the data format "GIF" can for instance be assigned the numeral "1", the data format "JPEG" (Joint Picture Expert Group) can be assigned the numeral "2", and the data format "BMP" (Bitmap) can be assigned the numeral "3", and again these numerals can be suitably binary-encoded.

In that case, the common ID code **35, 40** could look like this:

2/2/1/3/1

This common ID code **35, 40** makes the same statement as the one described above in text format. Here the first numeral "2" of the common ID code **35, 40** stands for the number of data fields present, in addition to the first data field **15**, in the transmission frame **1** of the short message **5**. The second numeral "2" of the common ID code **35, 40** refers, within the first table for data types, to the data type "Audio Data" and thus states that audio data are stored in the second data field **20**. The third numeral "1" in the common ID code **35, 40** refers within the second table for data formats of the data type "Audio Data" to the "WAV" data format and states that the data stored in the second data field **20** are in the "WAV" data format. The fourth numeral "3" of the common ID code **35, 40** refers within the first table for data types to the data type "Image Data" and thus states that image data are stored in the third data field **25**. The fifth numeral "1" in the common ID code **35, 40** refers within the third table for data formats of the data type "Image Data" to the "GIF" data format and states that the data stored in the third data field **25** are in the "GIF" data format.

Based on the common ID code **35, 40** transmitted to the first subscriber **60**, a decision can be made in the first subscriber whether it makes sense at all or is wanted to download the second data field **20** and/or the third data field **25** from the network operator **70**. If the first subscriber **60** lacks audio capacity, or in other words has no capability of processing or playing back audio data, then it makes no sense to download the audio data from the second data field **20** from the network operator **70**. If the first subscriber **60** has no image capability, that is, image data cannot be processed or played back in the first subscriber **60**, then again it makes no sense to download image data from the third data field **25** from the network operator **70**.

For selecting the data fields of the transmission frame **1** of the short, message **5** that are to be downloaded from the network operator **70**, provision can be made for displaying the common ID code **35, 40** on a display device of the second subscriber **60**.

The short message **5** could also include a transmission frame **1** comprising precisely two data fields **15, 20**; in the first data field **15**, the text data with the common ID code **35, 40** are then present, as described, while in the second data field **20**, a plurality of data types or media are combined. However, it can also be provided that N data types or media, to be transmitted in the short message **5**, are distributed to N or N+1 data fields in the transmission frame **1** of the short message **5**. In that case, the first subscriber **60** can download all the data fields of the short message **5** from the network operator **70** either individually or all together.

In the first subscriber **60**, an evaluation of the transmitted common ID code **35, 40** can also already be performed, so that their display on the display device of the first subscriber **60** already indicates which data fields of the short message **5** can be downloaded at all from the network operator **70**, based on the functionality of the first subscriber **60**.

The second subscriber **65** generates a short message **5** in the described transmission frame **1**. The generation of a transmission frame **1** in the second subscriber **65** can be done simply by linking together the individual data fields **15, 20, 25, 30**, optionally adding to each of them a respective one of the data-field-specific ID codes **45, 50, 55, 75**. The network operator **70** in turn receives and stores short messages **5** in memory in the transmission frame **1** described. If the first subscriber **60** has the appropriate functionality, provision can be made for the transmission frame **1** to downloaded in its entirety from the network operator **70** and transmitted to the first subscriber **60**. In this case, the first subscriber **60** receives the short message **5** in the transmission frame **1** described, optionally stores it in memory, and/or plays it back in visual and/or acoustical form. The first subscriber **60** receives at least a single data field of the transmission frame **1**, optionally stores it in memory, and/or plays it back visually and/or acoustically. An evaluation of received data fields **15, 20, 25, 30** in the network operator **70** and in the first subscriber **60** can for instance be done on the basis of the data-field-specific ID codes **45, 50, 55, 75** if these have been transmitted with the associated data fields **15, 20, 25, 30**, or on the basis of the first ID code **35** and/or second ID code **40** if they have been transmitted.

The transmission frame **1** of the invention is not limited to use in a radiotelecommunications network but can also be used in a landline telecommunications network **10**, in which case the subscribers **60, 65** and the network operator **70** are also connected by landline. Provision can also be made for one of the two subscribers **60, 65** to be in communication via a landline telecommunications network **10**, and for the other of the two subscribers **60, 65** to be in communication via a wireless telecommunications network **10**, with the network operator **70**, so that the transmission frame **1** is suitable for transmitting short messages **5** both in the landline telecommunications network and the wireless telecommunications network **10**.

What is claimed is:

1. A transmission frame **(1)** for transmitting short messages **(5)** in a telecommunications network **(10)** in the form of a radiotelecommunications network, comprising:

at least two data fields **(15, 20, 25, 30)**, wherein data of a short message **(5)** are stored in memory in the data fields **(15, 20, 25, 30)**, and wherein data in a first data format are stored in a first data field **(15)** of the short message **(5)**, and data in a second data format, different from the first data format, are stored in a second data field **(20)** of the short message **(5)**, wherein a first ID code **(35)**, which identifies the makeup of the short message **(5)**, is provided in the first date field **(15)**, wherein the first ID code **(35)** includes indications about the number of data fields **(15, 20, 25, 30)** and/or about the data formats in the data fields **(15, 20, 25, 30)**, and/or about the size of the data fields **(15, 20, 25, 30)**, wherein in each of at least two data fields **(15, 20.25, 30)**, one data-field-specific ID code, which identifies the makeup and for content of the corresponding data field **(15, 20, 25, 30)**, per data field is provided.

2. The transmission frame **(1)** of claim **1**, wherein a second ID code **(40)**, which identifies the content of the short message **(5)**, is provided in the first data field **(15)**.

3. The transmission frame **(1)** of claim **2**, wherein the second ID code **(40)** includes indications about the data type, including audio or image data, of the data stored in the data fields **(15, 20, 25, 30)**.

4. The transmission frame **(1)** of claim **1**, wherein only the first data field **(15)** is limited in its size to a predetermined value.

5. The transmission frame **(1)** of claim **1**, wherein the data stored in the first data field **(15)** are present in a data format that is readable by all the subscribers of the telecommunications network **(10)**.

6. The transmission frame **(1)** claim **1**, wherein the data stored in the first data field **(15)** are in a text format, in accordance with the GSM-SMS format (Global System for Mobile Communications—Short Message Service).

7. The transmission frame **(1)** claim **1**, wherein data are stored In a plurality of data formats In one of the data fields **(15, 20, 25, 30)**.

8. The transmission frame **(1)** of claim **1**, wherein only data in a single data format are stored in each data field **(15, 20, 25, 30)**.

9. A telecommunications device **(60, 65, 70)**, in the for of a radio unit, comprising:

a transmission frame **(1)** for transmitting short messages **(5)** in a telecommunications network **(10)** in the form of a radiotelecommunications network, wherein at least two data fields **(15, 20, 25, 30)** are provided in the transmission frame **(1)**, wherein data of a short message **(5)** are stored In memory in the data fields **(15, 20, 25, 30)**, and wherein data in a first data format are stored in a first data field **(15)** of the short message **(5)** and data in a second data format, different from the first data format, are stored in a second data field **(20)** of the short messages **(5)**, wherein a first ID code **(35)**, which identifies the makeup of the short message **(5)**, is provided in the first data field **(15)**, wherein the first ID code **(35)** includes indications about the number of data fields **(15, 20, 25, 30)** and/or about the data formats in the data fields **(15, 20, 25, 30)**, and/or about the size of the data fields **(15, 20, 25, 30)**, wherein in each of at least two data fields **(15, 20, 25, 30)**, one data-field-specific ID code, which identifies the makeup and/or content of the corresponding data field **(15, 20, 25, 30)**, per data field is provided.

* * * * *

JS 44 (Rev. 12/07) ORIGINAL

CIVIL COVER SHEET

The JS 44 civil cover sheet and the information contained herein neither replace nor supplement the filing and service of pleadings or other papers as required by law, except as provided by local rules of court. This form, approved by the Judicial Conference of the United States in September 1974, is required for the use of the Clerk of Court for the purpose of initiating the civil docket sheet. (SEE INSTRUCTIONS ON THE REVERSE OF THE FORM.)

I. (a) PLAINTIFFS

Research in Motion Limited and Research in Motion Corporation

DEFENDANTS

IPCom GmbH & Co., KG

3-08CV0903-G

(b) County of Residence of First Listed Plaintiff Dallas
(EXCEPT IN U.S. PLAINTIFF CASES)

County of Residence of First Listed Defendant Pullach, Germany
(IN U.S. PLAINTIFF CASES ONLY)

NOTE: IN LAND CONDEMNATION CASES, USE THE LOCATION OF THE LAND INVOLVED.

(c) Attorney's (Firm Name, Address, and Telephone Number)

John Russell Emerson; Haynes and Boone LLP; 901 Main Street, Suite 3100; Dallas, TX 75202; 214.651.5000

Attorneys (If Known)

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II. BASIS OF JURISDICTION (Place an "X" in One Box Only)

- ☐ 1 U.S. Government Plaintiff
- ☒ 3 Federal Question (U.S. Government Not a Party)
- ☐ 2 U.S. Government Defendant
- ☐ 4 Diversity (Indicate Citizenship of Parties in Item III)

III. CITIZENSHIP OF PRINCIPAL PARTIES (Place an "X" in One Box for Plaintiff and One Box for Defendant)
(For Diversity Cases Only)

	PTF	DEF		PTF	DEF
Citizen of This State	☐ 1	☐ 1	Incorporated *or* Principal Place of Business In This State	☐ 4	☐ 4
Citizen of Another State	☐ 2	☐ 2	Incorporated *and* Principal Place of Business In Another State	☐ 5	☐ 5
Citizen or Subject of a Foreign Country	☐ 3	☐ 3	Foreign Nation	☐ 6	☐ 6

IV. NATURE OF SUIT (Place an "X" in One Box Only)

CONTRACT	TORTS		FORFEITURE/PENALTY	BANKRUPTCY	OTHER STATUTES
☐ 110 Insurance	PERSONAL INJURY	PERSONAL INJURY	☐ 610 Agriculture	☐ 422 Appeal 28 USC 158	☐ 400 State Reapportionment
☐ 120 Marine	☐ 310 Airplane	☐ 362 Personal Injury - Med. Malpractice	☐ 620 Other Food & Drug	☐ 423 Withdrawal 28 USC 157	☐ 410 Antitrust
☐ 130 Miller Act	☐ 315 Airplane Product Liability	☐ 365 Personal Injury - Product Liability	☐ 625 Drug Related Seizure of Property 21 USC 881		☐ 430 Banks and Banking
☐ 140 Negotiable Instrument	☐ 320 Assault, Libel & Slander	☐ 368 Asbestos Personal Injury Product Liability	☐ 630 Liquor Laws	PROPERTY RIGHTS	☐ 450 Commerce
☐ 150 Recovery of Overpayment & Enforcement of Judgment	☐ 330 Federal Employers' Liability	PERSONAL PROPERTY	☐ 640 R.R. & Truck	☐ 820 Copyrights	☐ 460 Deportation
☐ 151 Medicare Act	☐ 340 Marine	☐ 370 Other Fraud	☐ 650 Airline Regs.	☒ 830 Patent	☐ 470 Racketeer Influenced and Corrupt Organizations
☐ 152 Recovery of Defaulted Student Loans (Excl. Veterans)	☐ 345 Marine Product Liability	☐ 371 Truth in Lending	☐ 660 Occupational Safety/Health	☐ 840 Trademark	☐ 480 Consumer Credit
☐ 153 Recovery of Overpayment of Veteran's Benefits	☐ 350 Motor Vehicle	☐ 380 Other Personal Property Damage	☐ 690 Other		☐ 490 Cable/Sat TV
☐ 160 Stockholders' Suits	☐ 355 Motor Vehicle Product Liability	☐ 385 Property Damage Product Liability	LABOR	SOCIAL SECURITY	☐ 810 Selective Service
☐ 190 Other Contract	☐ 360 Other Personal Injury		☐ 710 Fair Labor Standards Act	☐ 861 HIA (1395ff)	☐ 850 Securities/Commodities/ Exchange
☐ 195 Contract Product Liability			☐ 720 Labor/Mgmt. Relations	☐ 862 Black Lung (923)	☐ 875 Customer Challenge 12 USC 3410
☐ 196 Franchise			☐ 730 Labor/Mgmt.Reporting & Disclosure Act	☐ 863 DIWC/DIWW (405(g))	☐ 890 Other Statutory Actions
REAL PROPERTY	CIVIL RIGHTS	PRISONER PETITIONS	☐ 740 Railway Labor Act	☐ 864 SSID Title XVI	☐ 891 Agricultural Acts
☐ 210 Land Condemnation	☐ 441 Voting	☐ 510 Motions to Vacate Sentence	☐ 790 Other Labor Litigation	☐ 865 RSI (405(g))	☐ 892 Economic Stabilization Act
☐ 220 Foreclosure	☐ 442 Employment	Habeas Corpus:	☐ 791 Empl. Ret. Inc. Security Act	FEDERAL TAX SUITS	☐ 893 Environmental Matters
☐ 230 Rent Lease & Ejectment	☐ 443 Housing/ Accommodations	☐ 530 General		☐ 870 Taxes (U.S. Plaintiff or Defendant)	☐ 894 Energy Allocation Act
☐ 240 Torts to Land	☐ 444 Welfare	☐ 535 Death Penalty	IMMIGRATION	☐ 871 IRS—Third Party 26 USC 7609	☐ 895 Freedom of Information Act
☐ 245 Tort Product Liability	☐ 445 Amer. w/Disabilities - Employment	☐ 540 Mandamus & Other	☐ 462 Naturalization Application		☐ 900Appeal of Fee Determination Under Equal Access to Justice
☐ 290 All Other Real Property	☐ 446 Amer. w/Disabilities - Other	☐ 550 Civil Rights	☐ 463 Habeas Corpus - Alien Detainee		☐ 950 Constitutionality of State Statutes
	☐ 440 Other Civil Rights	☐ 555 Prison Condition	☐ 465 Other Immigration Actions		

V. ORIGIN (Place an "X" in One Box Only)

☒ 1 Original Proceeding ☐ 2 Removed from State Court ☐ 3 Remanded from Appellate Court ☐ 4 Reinstated or Reopened ☐ 5 Transferred from another district (specify) ☐ 6 Multidistrict Litigation ☐ 7 Appeal to District Judge from Magistrate Judgment

VI. CAUSE OF ACTION

Cite the U.S. Civil Statute under which you are filing (**Do not cite jurisdictional statutes unless diversity**):
35 U.S.C. Sect. 1, et seq.; 28 U.S.C. Sect. 2201, et seq.

Brief description of cause:
Declaratory judgment of patent non-infringement and invalidity

VII. REQUESTED IN COMPLAINT:

☐ CHECK IF THIS IS A CLASS ACTION UNDER F.R.C.P. 23

DEMAND $

CHECK YES only if demanded in complaint:
JURY DEMAND: ☑ Yes ☐ No

VIII. RELATED CASE(S) IF ANY (See instructions): JUDGE _____ DOCKET NUMBER _____

DATE 05/28/2008

SIGNATURE OF ATTORNEY OF RECORD

FOR OFFICE USE ONLY

RECEIPT # _____ AMOUNT _____ APPLYING IFP _____ JUDGE _____ MAG. JUDGE _____